necessary rules for controlling radiation exposure to such sources. The code also directed the Department of Health to establish, carry out, and enforce a radiation control program pursuant to the adopted rules and any federal-state agreement (The 1981 "Utah Health Code" is contained in Appendix A with pertinent statutes).

The Department of Health is divided into four Divisions. (1) The Division of Health Planning and Facilities; (2) The Division of Environmental Health; (3) The Division of Community Health Services; and (4) The Division of Family Health Services. The Division of Environmental Health is divided into six (6) Bureaus including the Bureau of Radiation Control which includes the functions of the Bureau of Uranium Mill Tailings Management. The Bureau is only concerned with title I UMTRPA activities. A chart showing the organization of the Department of Health and a function chart of the Bureau of Radiation Control are contained in Appendix B. Since this chart was drawn, a recombination of the Bureau of Radiation Control and the Bureau of Uranium Mill Tailings Management was effected with the structure as indicated in the function chart also included in Appendix B. The current staff includes one (1) health physicist certified by the American Board of Health Physics, two (2) health physicists one with extensive experience, and one (1) other staff member undergoing in-house training and attending NRC training courses.

Personnel working in Radioactive Materials Program:

Name	Time (percent)	Responsibilities
Larry F. Anderson	20	Administrative.
Blaine Howard	100	Licensing and Inspections.
Arnold J. Peart	100	Licensing and Inspections.
Donald G. Mitchell	10	Training in Licensing and Inspection.
Gerald R. Ripley	10	Training in Licensing and Inspection.
New Hire	10	Training in Licensing and Inspection.

Resume's of the current staff are included in Appendix B. The five categories of job descriptions included in the appendix will all be necessary to allow for promotion incentives for the in-house training program. This will allow hiring of individuals with limited experience and involving them in our training program with advancement available when training and experience requirements are reached.

Standard letters, standard forms, and license conditions have been prepared. Copies of the most recent versions of these materials have been included in Appendix C.

The Bureau has on hand sufficient equipment and instrumentation for the adequate conduct of the present Radiation Control Program. An inventory of this equipment is included in Appendix D.

The Utah Legislature has authorized appropriations to carry out the regulatory functions of the Bureau.

V. Emergency Response

All of the current technical staff have attended the training course in Radiological Emergency Response Operations for Radiological Emergency Response Teams of State and local governments formally sponsored by the Office of State Programs, U.S. Nuclear Regulatory Commission. The Bureau has developed a radiological comprehensive emergency management section with the Utah Highway Patrol.

[FR Doc. 83-34511 Filed 12-29-83; 8:45 am]

BILLING CODE 6560-50-M

federal register

Friday
January 20, 1984

Part III

Department of Labor

Employment Standards Administration, Wage and Hour Division

Minimum Wages for Federal and Federally Assisted Construction; General Wage Determination Decisions; Notice

DEPARTMENT OF LABOR

Employment Standards Administration, Wage and Hour Division

Minimum Wages for Federal and Federally Assisted Construction; General Wage Determination Decisions

General wage determination decisions of the Secretary of Labor specify, in accordance with applicable law and on the basis of information available to the Department of Labor from its study of local wage conditions and from other sources, the basic hourly wage rates and fringe benefit payments which are determined to be prevailing for the described classes of laborers and mechanics employed on construction projects of the character and in the localities specified therein.

The determinations in these decisions of such prevailing rates and fringe benefits have been made by authority of the Secretary of Labor pursuant to the provisions of the Davis-Bacon Act of March 3, 1931, as amended (46 Stat. 1494, as amended, 40 U.S.C. 276a) and of other Federal statutes referred to in 29 CFR 1.1 (including the statutes listed at 36 FR 306 following Secretary of Labor's Order No. 24–70) containing provisions for the payment of wages which are dependent upon determination by the Secretary of Labor under the Davis-Bacon Act; and pursuant to the provisions of part 1 of subtitle A of title 29 of Code of Federal Regulations, Procedure for Predetermination of Wage Rates (37 FR 21138) and of Secretary of Labor's Orders 12–71 and 15–71 (36 FR 8755, 8756). The prevailing rates and fringe benefits determined in these decisions shall, in accordance with the provisions of the foregoing statutes, constitute the minimum wages payable on Federal and federally assisted construction projects to laborers and mechanics of the specified classes engaged on contract work of the character and in the localities described therein.

Good cause is hereby found for not utilizing notice and public procedure thereon prior to the issuance of these determinations as prescribed in 5 U.S.C. 553 and not providing for delay in effective date as prescribed in that section, because the necessity to issue construction industry wage determination frequently and in large volume causes procedures to be impractical and contrary to the public interest.

General wage determination decisions are effective from their date of publication in the **Federal Register** without limitation as to time and are to be used in accordance with the provisions of 29 CFR Parts 1 and 5. Accordingly, the applicable decision together with any modifications issued subsequent to its publication date shall be made a part of every contract for performance of the described work within the geographic area indicated as required by an applicable Federal prevailing wage law and 29 CFR, Part 5. The wage rates contained therein shall be the minimum paid under such contract by contractors and subcontractors on the work.

Modifications and Supersedeas Decisions to General Wage Determination Decisions

Modifications and supersedeas decisions to general wage determination decisions are based upon information obtained concerning changes in prevailing hourly wage rates and fringe benefit payments since the decisions were issued.

The determinations of prevailing rates and fringe benefits made in the modifications and supersedeas decisions have been made by authority of the Secretary of Labor pursuant to the provisions of the Davis-Bacon Act of March 3, 1931, as amended (46 Stat. 1494, as amended, 40 U.S.C. 276a) and of other Federal statutes referred to in 29 CFR 1.1 (including the statutes listed at 36 FR 306 following Secretary of Labor's Order No. 24–70) containing provisions for the payment of wages which are dependent upon determination by the Secretary of Labor under the Davis-Bacon Act; and pursuant to the provisions of part 1 of subtitle A of title 29 of Code of Federal Regulations, Procedure for Predetermination of Wage Rates (37 FR 21138) and of Secretary of Labor's orders 13–71 and 15–71 (36 FR 8755, 8756). The prevailing rates and fringe benefits determined in foregoing general wage determination decisions, as hereby modified, and/or superseded shall, in accordance with the provisions of the foregoing statutes, constitute the minimum wages payable on Federal and federally assisted construction projects to laborers and mechanics of the specified classes engaged in contract work of the character and in the localities described therein.

Modifications and supersedeas decisions are effective from their date of publication in the **Federal Register** without limitation as to time and are to be used in accordance with the provisions of 29 CFR Parts 1 and 5.

Any person, organization, or governmental agency having an interest in the wages determined as prevailing is encouraged to submit wage rate information for consideration by the Department. Further information and self-explanatory forms for the purpose of submitting this data may be obtained by writing to the U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, Office of Government Contract Wage Standards, Division of Government Contract Wage Determinations, Washington, D.C. 20210. The cause for not utilizing the rulemaking procedures prescribed in 5 U.S.C. 553 has been set forth in the original General Determination Decision.

Modifications to General Wage Determination Decisions

The numbers of the decisions being modified and their dates of publication in the **Federal Register** are listed with each State.

Connecticut: CT83-3021	June 3, 1983.
Iowa:	
IA83-4035	May 13, 1983.
IA83-4050	July 15, 1983.
Kansas:	
KS83-4066	Sept. 9, 1983.
KS83-4063	Sept. 2, 1983.
Maryland: MD80-3014	Mar. 28, 1980.
New York:	
NY81-3045	July 17, 1981.
NY81-3061	Sept. 11, 1981.
NY83-3044	Aug. 26, 1983.
Ohio: OH83-5127	Dec. 23, 1983.
Rhode Island: RI83-3042	Aug. 19, 1983.
Texas: TX83-4081	Oct. 21, 1983.
Utah: UT83-5120	Sept. 30, 1983.

Supersedeas Decisions to General Wage Determination Decisions

The number of the decisions being superseded and their dates of publication in the **Federal Register** are listed with each State. Supersedeas decision numbers are in parentheses following the numbers of the decisions being superseded.

Texas: TX83-4003 (TX84-4001)	Jan. 7, 1983.

Signed at Washington, D.C. this 13th day of January, 1984.

James L. Valin,

Assistant Administrator.

[FR Doc. 84-1301 Filed 1-19-84; 8:45 am]

BILLING CODE 4510-27-M

MODIFICATIONS

	Basic Hourly Rates	Fringe Benefits
DECISION NO. CT83-3021 - MOD. #10 (48 FR 25090 - June 3, 1983) STATEWIDE		
CHANGE:		
BRICKLAYERS; CEMENT MASONS; CEMENT FINISHERS; MARBLE MASONS; PLASTERERS; STONE MASONS; TERRAZZO WORKERS; TILE SETTERS:		
BUILDING CONSTRUCTION:		
Area 2	16.50	2.68
Area 3	16.38	2.55
LINE CONSTRUCTION:		
Area 2 - Traffic Control, Illumination & Maintenance		
Linemen, technicians & cable splicers	16.56	2.30+ 4.75%
Equipment operator	14.08	2.30+ 4.75%
Driver groundman	12.42	2.30+ 4.75%
Groundman	11.59	2.30+ 4.75%

	Basic Hourly Rates	Fringe Benefits
DECISION #IA83-4035-MOD#4 (48 FR 21783-May 13,1983) Pottawattomie County, Iowa		
CHANGE:		
Line Construction:		
Group 1	$16.09	1.00+ 7½%+b
Group 2	13.35	1.00+ 7½%+b
Group 3	12.87	1.00+ 7½%+b
Group 4	10.46	1.00+ 7½%+b
Group 5	10.62	1.00+ 7½%+b
Group 6	10.30	1.00+ 7½%+b
Group 7	12.39	1.00+ 7½%+b
DECISION #IA83-4050-MOD#5 (48 FR 32455-July 15,1983) Woodbury County, Iowa		
CHANGE:		
Plumber & Pipefitter	13.00	1.84

	Basic Hourly Rates	Fringe Benefits
DECISION NO. NY 83-3044 MOD #3 (48 FR 38963 - August 26, 1983) STEUBEN COUNTY, NEW YORK		
CHANGE:		
LABORERS	$10.87	1.15

MODIFICATIONS

	Basic Hourly Rates	Fringe Benefits
DECISION #KS83-4066-MOD#3 (48 FR 40838-September 9, 1983) Douglas, Jefferson, Miami, Leavenworth & Shawnee Counties, Kansas		
CHANGE:		
Line Construction:		
ZONE 1:		
Lineman	$17.80	8½%+ 1.00
Lineman Operator	16.60	8½%+ 1.00
Groundman Powderman	12.47	8½%+ 1.00
Groundman	11.87	8½%+ 1.00
ZONE 2		
Lineman	15.97	3½%+ 1.00
Cable Splicer	16.77	3½%+ 1.00
Powderman, Line truck and Equipment Operators	13.19	3½%+ 1.00
Groundman	9.67	3½%+ 1.00
DECISION #KS83-4063-MOD#2 (48 FR 40085-September 2, 1983) Shawnee County, Kansas		
DELETE:		
Elevator Constructors	12.21	a+2.33
CHANGE:		
CARPENTERS:		
Piledrivermen	12.625	1.80
Line Construction:		
Lineman	15.97	3½%+ 1.00
Cable Splicer	16.77	3½%+ 1.00
Powderman, Line Truck Equipment Operator	13.19	3½%+ 1.00
Groundman	9.67	3½%+ 1.00
ROOFERS:		
Roofers	14.66	b+1.29
Pitch	15.76	b+1.29
SHEET METAL WORKERS	14.68	3%+2.93

	Basic Hourly Rates	Fringe Benefits
DECISION NO. MD80-3014- MOD. #1 (45 FR 20663-March 28,1980 Cecil County, Maryland		
ADD:		
ASBESTOS WORKERS	10.155	1.82

	Basic Hourly Rates	Fringe Benefits
DECISION NO. NY 81-3045 MOD #4 (46 FR 37204 - July 17, 1981) NIAGARA COUNTY, NEW YORK		
CHANGE:		
LABORERS: BUILDING, HEAVY & HIGHWAY CONSTRUCTION; Niagara County, except the city of North Tonawonda		
GROUP I	$13.66	5.30
GROUP II	14.16	5.30
GROUP III	14.86	5.30
GROUP IV	14.93	5.30

MODIFICATIONS

DECISION #NY81-3061-MOD#5 (46 FR 45525-September 11, 1981) Clinton County, New York	Basic Hourly Rates	Fringe Benefits
ASBESTOS WORKERS	$16.60	2.36
BOILERMAKERS	18.16	3.381
BRICKLAYERS, CEMENT MASONS, MARBLE MASONS, PLASTERERS, TILE AND TERRAZZO WORKERS	13.12	1.40+a
CEMENT MASONS, Heavy & Highway	14.16	1.42+a
CARPENTERS & SOFT FLOOR LAYERS	12.70	2.105+a
PILEDRIVERMAN	12.85	2.105+a
MILLWRIGHTS	12.95	2.105+a
CARPENTERS, Heavy & Highway	13.87	2.125+a
ELECTRICIANS		
Zone I - City of Plattsburg and 5 mile Radius		
Electricians	13.70	2.10+4% +b
Cable Splicers	14.00	2.10+4% +b
Zone II - From Zone I to a 20 mile radius of Plattsburg		
Electricians	13.90	2.10+4% +b
Cable Splicers	14.20	2.10+4% +b
Zone III - Beyond Zone II		
Electricians	14.10	2.10+4% +b
Cable Splicers	14.40	2.10+4% +b
ELEVATOR CONSTRUCTORS	14.89	3.00+c +d
ELEVATOR CONSTRUCTORS' HELPER	10.42	3.00+c +d
ELEVATOR CONSTRUCTORS' HELPER PROBATIONARY	7.445	
GLAZIERS	11.93	.81+e
IRONWORKERS		
Structural, Ornamental, Reinforcing, Rodmen, Machinery Mover, Riggers, Fence Erectors, Stone Derrickmen	14.00	2.79
Sheeter	14.25	2.79
Sheeter, Bucker-up	14.125	2.79
LABORERS, Building		
Common Laborers and self-propelled Equipment Operators	$10.45	1.90+f
Concrete or plaster pump Operator, All men on building demolition and wrecking	10.60	1.90+f
Sandblasters and construction clean up, Driller, Wagon Jack or Wagon Drill Operator, Metal Form and Curb Setter, Asphalt Raker, Tail or Screw man on paving Machine	10.75	1.90+f
Acetylene Torch Operator on Demolition work and Cutting of pipes, Blasters	10.90	1.90+f
LABORERS:		
Heavy & Highway Construction		
CLASS A	11.74	2.00+h
CLASS B	11.94	2.00+h
CLASS C	12.14	2.00+h
CLASS D	12.34	2.00+h
PAINTERS		
Brush	11.93	.81+e
Spray Cup, Paperhanging, Taping	12.23	.81+e
Structural Steel, Swinging Scaffold, Boatswain Chair, Hanging Scaffold, Sandblasting	12.48	.81+e
PLUMBERS & STEAMFITTERS	14.30	2.45
ROOFERS		
Roofer	13.50	3.07
Pitch and Asbestos	14.00	3.07
SHEET METAL WORKERS	15.37	1.04+g
SPRINKLER FITTERS	16.92	3.23
POWER EQUIPMENT OPERATORS		
Building Construction		
CLASS I	14.66	3.20+a
CLASS II	15.55	3.20+a
CLASS III	16.06	3.20+a
CLASS IV	16.25	3.20+a

MODIFICATIONS

DECISION NO. NY81-3061 (CONT'D)	Basic Hourly Rates	Fringe Benefits
POWER EQUIPMENT OPERATORS (Cont'd)		
Rehabilitation work on residential structures over 4 stories defined to include demolition, alteration, and repair on any existing structure which is intended for predominantly residential use		
CLASS I	$11.00	3.20+L
CLASS II	11.66	3.20+L
CLASS III	12.05	3.20+L
CLASS IV	12.19	3.20+L
Heavy Highway		
GROUP I	15.29	3.50+k
GROUP II	14.79	3.50+k
GROUP III	13.36	3.50+k
GROUP IV	12.10	3.50+k
TRUCK DRIVERS		
Heavy & Highway Construction		
CLASS I	12.39	2.40+m
CLASS II	12.44	2.40+m
CLASS III	12.49	2.40+m
CLASS IV	12.64	2.40+m
CLASS V	12.79	2.40+m

Basic Hourly Rates	Fringe Benefits

MODIFICATIONS

DECISION NO. NY81-2061 (CONT'D)

CLASSIFICATION DEFINITIONS

POWER EQUIPMENT OPERATORS

BUILDING & REHABILITATION CONSTRUCTION

CLASS I - Oiler, fireman and heavy-duty greaser, boilers, and steam generators, pump, vibrator, mortar mixer, air compressor, dust collector, welding machine, well point, mechanical heater, generators, temporary light plants, concrete pumps, electric subermisible pump 4" and over, murphy type diesel generator, conveyor, elevators, concrete mixer and beltcrete power pack (belcrete system)

CLASS II - Bulldozer, push cat, tractor, traxcavator scraper, LeTourneau grader, form fine grader, road roller, blacktop roller, blacktop spreader, power brooms, sweepers, trenching machine, Barbar Green loader, side booms, hydro hammer, concrete spreader, concrete finishing machine, high lift, fork lift, one drum hoist, power hoisting (single drum), hoist - two drum or more, three drum engine, power hoisting (two drum and over), two drums and swinging engine, three drum swinging engine, hod hoist, A-L frame winches, core and well drillers (one drum), post hole digger, model CHB Vibro-Tamp or similar machine, batch bin and plant operator, dinkey locomotive, seeding and mulching machines.

CLASS III - Crane, hydraulic cranes, tower crane, locomotive crane, piledriver, cableway, derricks, whirlies, dragline, shovels, gradalls, power road grader, all CMI equipment, front-end rubber tire loader, tractor-mounted drill (quarry master), mucking machine, concrete central mix plant, concrete pump, belcrete system, automated asphalt concrete plant, and tractor road paver.

CLASS IV - Maintenance Engineer

MODIFICATIONS

DECISION NO. NY81-2061 (CONT'D)

LINE CONSTRUCTION:	Basic Hourly Rates	Fringe Benefits
Electrical Overhead & Underground Distribution Work & Signal Work for RR and for R.E.A. where no other trade is or has been involved:		
Journeyman Lineman & Technician	14.20	3.95+ 5%+a
Cable Splicer	18.92	3.95+ 5%+a
Groundman Digging Machine Operator, Groundman Dynamite Man	12.78	3.95+ 5%+a
Groundman Mobile Equipment Operator, Mechanic First Class, Ground Truck Driver	11.36	3.95+ 5%+a
Groundman Truck Driver (Tractor Trailer)	12.07	3.95+ 5%+a
Driver Mechanic, Groundman - Experienced	10.65	3.95+ 5%+a
All Overhead Transmission Line Work and Lighting for Athletic Fields		
Journeyman Lineman & Technician	16.32	3.95+ 5%+a
Groundman Digging Machine Operator, Groundman Dynamite Man	14.688	3.95+ 5%+a
Groundman Mobile Equipment Operator, Mechanic First Class Groundman Truck Driver	13.056	3.95+ 5%+a
Groundman Truck Driver (Tractor Trailer Unit)	13.872	3.95+ 5%+a
Driver Mechanic Groundman	12.24	3.95+ 5%+a

	Basic Hourly Rates	Fringe Benefits
Sub-Station Switching Substructures (when not part of the line), Electrical, Telephone or CATV Commercial Work, Street Lighting & Signal Systems where other trades are or have been involved		
Journeyman Lineman & Technician	17.20	3.95+ 5%+a
Cable Splicer	18.92	3.95+ 5%+a
Groundman Digging Machine Operator, Groundman Dynamite Man	15.48	3.95+ 5%+a
Groundman Mobile Equipment Operator, Mechanic First Class, Groundman Truck Driver	13.76	3.95+ 5%+a
Groundman Truck Driver (Tractor Trailer Unit)	14.62	3.95+ 5%+a
Driver Mechanic, Groundman	12.90	3.95+ 5%+a
All Pipe-type Cable Installations Maintenance Jobs or Projects		
Journeyman Lineman	17.20	3.95+ 5%+a
Certified Lineman Welder	18.06	3.95+ 5%+a
Cable Splicer	18.92	3.95+ 5%+a
Groundman Equipment Operator	17.20	3.95+ 5%+a
Groundman Truck Driver (Tractor Trailer Unit)	14.62	3.95+ 5%+a
Groundman Truck Drivers	13.76	3.95+ 5%+a
Groundman	12.90	3.95+ 5%+a

FOOTNOTE:

a. Paid Holidays: New Year's Day, Washington's Birthday, Good Friday, Decoration Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day and Election Day for the President of the United States and Election Day for the Governor of New York State, provided the employee works the day before or the day after the holiday.

MODIFICATIONS

DECISION NO. OH83-5127 - MOD. #1
(48 FR 56903 - December 23, 1983)
Adams, Allen,...Wood, & Wyandot Counties, Ohio

	Basic Hourly Rates	Fringe Benefits
Change:		
Electricians:		
Area 10:		
Wiremen & Technicians within 11 mi. radius of 3rd & Main Street, Dayton	$16.98	2.40+ 3½%
Wiremen & Technicians beyond 11 mi. radius of 3rd & Main Street, Dayton	17.21	2.40+ 3½%

DECISION NO. RI83-3042 MOD. #5
(48 FR 37809 - August 19, 1983)

Statewide, Rhode Island

	Basic Hourly Rates	Fringe Benefits
Change:		
Asbestos Workers	$17.63	4.13

DECISION #TX83-4081-MOD#2
(48 FR 48912-October 21, 1983)
Travis County, Texas

	Basic Hourly Rates	Fringe Benefits
CHANGE:		
Marble, tile & terrazzo finishers:		
Marble, tile & terrazzo	$ 8.57	$1.31
Floor machine op.	8.33	1.31
Base machine op.	8.82	1.31

DECISION NO. UT83-5120 - Mod. #3
(48 FR 44992 - September 30, 1983)
Statewide, Utah

	Basic Hourly Rates	Fringe Benefits
Omit:		
ELECTRICIANS:		
Area 2		
All Zones, Wage Rates and Classifications		
Add:		
ELECTRICIANS:		
Area 2		
Electricians; Technicians	$16.25	2.50+ 3.8%
Cable Splicers	16.75	2.50+ 3.8%

SUPERSEDEAS DECISION

STATE: Texas COUNTY: Bexar
DECISION NO.: TX84-4001 DATE: Date of Publication
Supersedes Decision No. TX83-4003, dated 1/7/83, in 48 FR 935.
DESCRIPTION OF WORK: Building Projects (does not include single family homes & apartments up to & including 4 stories). (use current heavy & highway general wage determination for Paving & Utilities Incidental to Building Construction).

	Basic Hourly Rates	Fringe Benefits
ASBESTOS WORKERS	$15.60	3.24
BOILERMAKERS	16.40	2.645
BRICKLAYERS & STONEMASONS	12.88	2.32
CARPENTERS:		
Carpenters	12.75	2.63
Millwrights	13.05	2.63
CEMENT MASONS	13.22	1.15
ELECTRICIANS:		
Electricians	15.49	.80+6%
Cable splicers	15.74	.80+6%
ELEVATOR CONSTRUCTORS:		
Mechanics	14.295	3.00+a
Helpers	70%JR	3.00+a
Helpers (Prob.)	50%JR	
IRONWORKERS	12.55	3.57
LABORERS:		
GROUP 1 - General laborer	8.24	1.50
GROUP 2 - All power tools & equipment ops.; cutting torch man; power buggy op.; wagon drill; well driller; drilling rig tender; cement finisher tender; handling creosoted materials; scale man on batch plants; asphalt raker; concrete & clay & all non-metallic pipe laying; plasterer tender; brick tender; lather tender	8.49	1.50
GROUP 3 - Mortar mixer; grout machines; pumpcrete machines; gunnite mixing machines; running sand dryer & loading; operating sandblaster; bell hole man; blaster, powderman; gunnite nozzleman	8.74	1.50
LINE CONSTRUCTION:		
Lineman	16.69	.80+ 3-1/2%
Cable splicer	16.94	"
Groundman	9.18	"
MARBLE, TILE & TERRAZZO WORKERS	$13.27	2.27
MARBLE, TILE & TERRAZZO FINISHERS:		
Marble, tile & terrazzo	8.57	1.31
Floor machine operators	8.33	1.31
Base machine operators	8.82	1.31
PAINTERS:		
Brush; paperhanger; taper & floater; roller	11.85	.65
Brush on all structural steel; spray on any other surface other than steel	12.10	.65
PLUMBERS & PIPEFITTERS	17.10	1.73
ROOFERS:		
Roofers; deckman	9.24	.50
Kettlemen	8.19	.50
Waterproofers	8.69	.50
SHEET METAL WORKERS	15.95	2.31+3%
SPRINKLER FITTERS	16.17	3.23
POWER EQUIPMENT OPERATORS:		
GROUP 1	13.35	2.50
GROUP 2	11.80	2.50
GROUP 3	9.90	2.50
GROUP 4	9.50	2.50
WELDERS - receive rate prescribed for craft performing operation to which welding is incidental.		

PAID HOLIDAYS FOR ELEVATOR CONSTRUCTORS
A-New Years' Day; B-Memorial Day; C-Independence Day; D-Labor Day; E-Thanksgiving Day; F-the Friday after Thanksgiving Day; G-Christmas Day

FOOTNOTE FOR ELEVATOR CONSTRUCTORS
a - 1st 6 mos. - none; 6 mos. to 5 yrs - 6%; over 5 yrs. - 8% of basic hourly rate. Also 7 Paid Holidays A thru G

Unlisted classification needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5(a)(1)(ii)).

DECISION NO. TX84-4001

POWER EQUIPMENT OPERATORS CLASSIFICATION DEFINITIONS

GROUP 1 - All foundation drilling rigs; all rollers (5 tons or over); backfiller; backhoe; blade graders (self-propelled); bull clam; bulldozers; cableway; clamshell; crane (power operated, all types); derricks (power operated, all types); draglines; DW-10 caterpillar and similar tractors; elevating graders (self-propelled); euclid; fork lift used on construction; gasoline or diesel-driven welding machines (7 to 12); gradall; heavy duty mechanic; high lifts; hoist (two drums or more); locomotives; mixer (14 cu. ft. or over); mixmobile; paving mixers (all sizes); piledriver; pumpcrete machine; rock crusher on job; scoopmobile; scrapers; shovel, power operated; turnapulls; trenching machines (all sizes); winch truck

GROUP 2 - Air compressor (any time there are three or more attachments operating on a 125 cu. ft. air compressor or less, a light equipment operator shall be employed. Any compressor over 125 cu. ft. shall have a light equipment operator); blade graders (towed); building elevator used on construction; flex planes; form graders; hoist (single drum); mixer (less than 14 cu. ft.); pneumatic roller; pulsometers; pump (2½ or larger shall require a light equipment operator); three to six welding machines or any three pieces of equipment of equal or similar nature

GROUP 3 - Fireman

GROUP 4 - Oiler

[FR Doc. 84-1301 Filed 1-19-84; 8:45 am]

BILLING CODE 4510-27-C

federal register

Friday
January 20, 1984

Part IV

Department of Housing and Urban Development

Office of the Secretary

24 CFR Part 841

Prototype Cost Determinations Issued Under the United States Housing Act of 1937; Final Rule

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of the Secretary

24 CFR Part 841

[Docket No. N-84-1331; FR-1850]

Prototype Cost Determinations Issued Under the United States Housing Act of 1937

AGENCY: Office of the Assistant Secretary for Public and Indian Housing, HUD.

ACTION: Notice of Prototype Cost Determinations.

SUMMARY: This Notice establishes prototype limits for development of public housing new construction projects under the United States Housing Act of 1937. The public housing prototype cost determinations stated in this Notice supersede the prototype cost schedules published on December 7, 1982, 47 FR 55136, and all amendments and additions to such schedules published before the date of this Notice.

EFFECTIVE DATE: January 20, 1984.

FOR FURTHER INFORMATION CONTACT: Pat Hampton, Acting Director, Technical Support Division, Office of Public Housing, Room 6248, Department of Housing and Urban Development, 451 Seventh Street, S.W., Washington, D.C. 20410, telephone (202) 755-4956. (This is not a toll-free number.)

SUPPLEMENTARY INFORMATION: Section 6(b) of the United States Housing Act of 1937 (42 U.S.C. 1437d) requires HUD to determine costs in different areas for construction and equipment (prototype costs) of new dwelling units suitable for occupancy by low-income families. This determination must be made at least once a year and published in the **Federal Register.** Under the law, the Department develops prototype costs for public and Indian housing projects and these prototype costs constitute a limit on development cost for the construction and equipment of new projects.

The schedules in this Notice represent the annual update of per unit prototype cost limits for development of public housing under 24 CFR Part 841 (see §841.204).

The prototype cost determinations for the annual update are based on actual public housing and insured multifamily project data from HUD field offices and on construction cost information published by the private sector of the housing industry.

Where prototype schedules are established for special Indian prototype cost areas under 24 CFR 805.213, the prototype cost limits apply only for development of Indian Housing (these special areas and the prototype cost limits for these areas are developed and determined by the Office of Indian Housing.) The Indian prototype schedules will be published separately in the near future. Until that publication becomes effective, Indian prototype schedules published December 7, 1982 (see 47 FR 55136) shall remain in effect.

Since Section 6(b) of the U.S. Housing Act of 1937 provides that the prototype costs shall become effective upon publication in the **Federal Register,** this Notice is effective today, the day of publication.

The following factors were considered in developing prototype costs:

1. Prototype cost comprises the cost of dwelling structures (Account No. 1460), and dwelling equipment (Account No. 1465), as described in HUD Low-Rent Housing Accounting Handbook 7510.1, Chapter 3, Section 15, and includes a pro rata share of the builders' fee and overhead, insurance, social security, sales tax, and bonds.

2. Prototype cost does not include the costs of site acqûisitions, site improvement, nondwelling structures or spaces (and equipment), planning (architectural-engneering fees, permit fees, inspection, and similar costs), relocation, interest or PHA administrative costs, all of which are described in HUD Low-Rent Housing Accounting Handbook 7510.1, Chapter 3, Section 15.

3. Section 6(b) of the Act identifies factors the Secretary is to consider in determining prototype costs, including the effectiveness of existing cost limits in the area, advice of local housing producers, maximization of energy conservation for heating, lighting and other purposes, and the extra durability required for safety, security and economical maintenance of the housing. (See 42 U.S.C. 1437d.)

4. Prototype costs are ceiling amounts that may be approved for a particular project. Other considerations for a project include the following:

For public housing developed under Part 841, compliance with applicable HUD Minimum Property Standards and planning and design criteria described in HUD Public Housing Development Handbook 7417.1.Rev. Development of Indian Housing under Part 805 shall take into account compliance with applicable HUD Minimum Property Standards, but shall not be controlled by such standards (See § 805.212(a)).

Written comments will be considered, and additional amendments will be published, if the Department determines that acceptance of the comments is appropriate. Comments with respect to cost limits for a given location should be sent to the local HUD office having jurisdiction for that location. A list of these offices follow:

Region I

Connecticut: Dept. of HUD, One Hartford Square West, Hartford, CT 06106
Massachusetts: Dept. of HUD, Bulfinch Bldg., 15 New Chardon Street, Boston, MA 02114
New Hampshire: Dept. of HUD, Norris-Cotton Federal Bldg., 275 Chestnut Street, Manchester, NH 03103
Maine: As above
Vermont: As above
Rhode Island: Dept. of HUD, Room 330, John O. Pastore Federal Building and U.S. Post Office, Providence, RI 02903

Region II

New Jersey: Dept. of HUD, Gateway Bldg. No. 1, Raymond Plaza, Newark, NJ 07102
New York: Dept. of HUD, 26 Federal Plaza, New York, NY 10278
Dept. of HUD, Statler Bldg., 107 Delaware Avenue, Buffalo, NY 14202
Caribbean: Dept. of HUD, Federico Degetau Federal Bldg., U.S. Courthouse, Room 428, Carlos E. Chardon Avenue, Hato Rey, PR 00918

Region III

Delaware: Dept. of HUD, 625 Walnut Street, Philadelphia, PA 19106
District of Columbia: Dept. of HUD, Universal North Bldg., 1875 Connecticut Avenue, N.W., Washington, D.C. 20009
Maryland: Dept. of HUD, Equitable Bldg., 10 North Calvert Street, Baltimore, MD 21202
Pennsylvania: Dept. of HUD, 625 Walnut Street, Philadelphia, PA 19106
Dept. of HUD, 445 Fort Pitt Blvd., Pittsburgh, PA 15219
Virginia: Dept. of HUD, 701 East Franklin Street, Richmond, VA 23219
West Virginia: Dept. of HUD, Kanawah Valley Bldg., Capitol and Lee Streets, Charleston, WV 25301

Region IV

Alabama: Dept. of HUD, Daniel Bldg., 15 South 20th Street, Birmingham, AL 35233
Florida: Dept. of HUD, 325 West Adams Street, Jacksonville, FL 32202
Georgia: Dept. of HUD, 75 Spring Street, S.W., Atlanta, GA 30303
Kentucky: Dept. of HUD, 539 River City Mall, P.O. Box 1044, Louisville, KY 40202
Mississippi: Dept. of HUD, 100 W. Capital Street, Jackson, MS 39201

North Carolina: Dept. of HUD, 415 North Edgeworth Street, Greensboro, NC 27401
South Carolina: Dept. of HUD, 1835–45 Assembly Street, Columbia, SC 29201
Tennessee: Dept. of HUD, 1 Commerce Place, Suite 1600, Nashville, TN 37239
Dept. of HUD, 1111 Northshore Drive, Knoxville, TN 37919

Region V

Illinois: Dept. of HUD, One North Dearborn Street, Chicago, IL 60602
Indiana: Dept. of HUD, P.O. Box 7047, 151 North Delaware Street, Indianapolis, IN 46207
Michigan: Dept. of HUD, 477 Michigan Ave., Detroit, MI 48226
Dept. of HUD, 2922 Fuller Avenue NE., Grand Rapids, MI 49505
Minnesota: Dept. of HUD, 220 South Second Street, Minneapolis, MN 55401
Ohio: Dept. of HUD, 200 North High Street, Columbus, OH 43215
Dept. of HUD, 777 Rockwell Avenue, Cleveland, OH 44114
Wisconsin: Dept. of HUD, 744 North Fourth Street, Milwaukee, WI 53203

Region VI

Arkansas: Dept. of HUD, 300 West Capitol, Suite 700, Little Rock, AR 72201
Louisiana: Dept. of HUD, 1001 Howard, New Orleans, LA 70113
New Mexico: Dept. of HUD, 1403 Slocum, P.O. Box 20050, Dallas, TX 75207
Oklahoma: Dept. of HUD, 200 N.W. 5th Street, Oklahoma City, OK 73102
Texas: Dept. of HUD, 1403 Slocum, P.O. Box 20050, Dallas, TX 75207
Dept. of HUD, 800 Dolorosa, P.O. Box 9163, San Antonio, TX 78285

Region VII

Iowa: Dept. of HUD, 210 Walnut Street, Des Moines, IA 50309
Louisiana: Dept. of HUD, 1103 Grand Ave., Kansas City, MO 64106
Kansas: As above
Missouri: As above
Dept. of HUD, 210 North Tucker Blvd., St. Louis, MO 63101
Nebraska: Dept. of HUD, 7100 West Center Road, Omaha, NE 68106

Region VIII

Colorado: Dept. of HUD, 1405 Curtis Street, Denver, CO 80202
Montana: As above
North Dakota: As above
South Dakota: As above
Utah: As above
Wyoming: As above

Region IX

Arizona: Dept. of HUD, One Embarcadero Center, Suite 1600, San Francisco, CA 94111
California: As above
Dept. of HUD, 2500 Wilshire Boulevard, Los Angeles, CA 90057
Dept. of HUD, 545 Downtown Plaza, P.O. Box 1978, Suite 250, Sacramento, CA 95809
Guam: Dept. of HUD, One Embarcadero Center, Suite 1600, San Francisco, CA 94111
Hawaii: Dept. of HUD, 300 Ala Moana Boulevard, Suite 3318, Honolulu, HI 96850
Nevada: Dept. of HUD, One Embarcadero Center, Suite 1600, San Francisco, CA 94111

Region X

Alaska: Dept. of HUD, 710 C Street, Module G, Anchorage, AK 99501
Oregon: Dept. of HUD, 520 SW Sixth Avenue, Portland, OR 97204
Washington: Dept. of HUD, 403 Arcade Plaza Building, 1321 Second Ave., Seattle, WA 98101

A Finding of No Significant Impact with respect to the environment required by the National Environmental Policy Act (42 U.S.C. 4321–4347) is unnecessary since statutorily required prototype costs are categorically excluded under 24 CFR 50.20(1).

The Catalog of Federal Domestic Assistance program numbers are: 14.146, Low Income Housing-Assistance Program (public housing), and 14.147, Low-Income Housing-Homeownership for Low-Imcome Families (Turnkey III, Mutual Help for Indians).

Accordingly, the prototype per unit cost schedules for all prototype cost areas, issued under 24 CFR Part 841, Prototype Cost Limits for Low-Income Public Housing, are hereby established as shown on the tables set forth below entitled "Prototype Per Unit Cost Schedule—Regions I through X."

(Sec. 7(d), Department of HUD Act, 42 U.S.C. 3535(d); Sec. 6(b), U.S. Housing Act of 1937, 42 U.S.C. 1437d(b))

Dated: January 9, 1984.

Warren T. Lindquist,

Assistant Secretary for Public and Indian Housing.

BILLING CODE 4210-33-M

PROTOTYPE PER UNIT COST SCHEDULE

	Number of bedrooms: 0	1	2	3	4	5	6
REGION I							
CONNECTICUT							
HARTFORD :							
DETACHED AND SEMIDETACHED	28,050	33,500	36,800	44,150	53,150	59,150	61,900
ROW DWELLINGS	25,500	30,350	33,950	40,300	48,400	53,900	56,500
WALKUP	22,900	28,350	31,950	38,150	43,950	48,400	50,700
ELEVATOR-STRUCTURE	29,300	34,000	43,150	------	------	------	------
NEW MILFORD :							
DETACHED AND SEMIDETACHED	26,800	32,150	35,500	42,500	51,100	56,850	59,550
ROW DWELLINGS	24,400	29,100	32,350	38,550	46,350	51,650	53,800
WALKUP	21,900	27,050	30,650	36,400	41,750	46,400	48,500
ELEVATOR-STRUCTURE	29,050	33,600	42,700	------	------	------	------
NEW HAVEN :							
DETACHED AND SEMIDETACHED	26,950	32,250	35,550	42,650	51,450	57,200	59,800
ROW DWELLINGS	24,250	29,100	32,350	38,550	46,350	51,650	53,900
WALKUP	21,900	27,050	30,500	36,550	42,100	46,400	48,500
ELEVATOR-STRUCTURE	29,050	33,600	42,700	------	------	------	------
BRIDGEPORT :							
DETACHED AND SEMIDETACHED	27,350	32,750	36,250	43,350	52,150	57,950	60,700
ROW DWELLINGS	24,400	29,100	32,350	38,550	46,350	51,650	53,800
WALKUP	21,850	26,900	30,600	36,150	41,900	46,200	48,350
ELEVATOR-STRUCTURE	29,650	34,350	43,600	------	------	------	------
NEW LONDON :							
DETACHED AND SEMIDETACHED	27,350	32,850	36,250	43,150	52,400	58,200	60,750
ROW DWELLINGS	24,700	29,700	33,100	39,550	47,450	52,950	55,400
WALKUP	22,850	27,000	30,600	36,400	42,050	46,450	48,700
ELEVATOR-STRUCTURE	29,650	34,300	43,600	------	------	------	------
WINDHAM :							
DETACHED AND SEMIDETACHED	27,350	32,850	36,250	43,150	52,400	58,200	60,750
ROW DWELLINGS	24,700	29,700	33,100	39,550	47,450	52,950	55,400
WALKUP	23,250	27,550	31,300	37,000	42,900	47,350	49,700
ELEVATOR-STRUCTURE	29,650	34,300	43,600	------	------	------	------
RIDGEFIELD :							
DETACHED AND SEMIDETACHED	33,500	40,150	44,350	53,050	64,000	70,850	74,400
ROW DWELLINGS	30,500	36,450	40,650	48,300	58,200	64,950	67,800
WALKUP	27,400	33,900	38,350	45,500	52,750	58,050	61,050
ELEVATOR-STRUCTURE	30,500	35,400	44,850	------	------	------	------
NORWICH :							
DETACHED AND SEMIDETACHED	27,250	32,800	36,250	43,200	52,100	57,950	60,600
ROW DWELLINGS	24,450	29,250	32,650	38,700	46,500	52,000	54,050
WALKUP	22,000	27,100	30,800	36,600	42,150	46,500	48,650
ELEVATOR-STRUCTURE	29,650	34,350	43,600	------	------	------	------
MAINE							
BANGOR :							
DETACHED AND SEMIDETACHED	28,200	33,850	35,700	42,500	51,250	56,850	59,250
ROW DWELLINGS	25,400	30,350	33,600	40,150	48,300	53,650	56,150
WALKUP	22,700	28,050	31,950	37,700	43,800	48,150	50,650
ELEVATOR-STRUCTURE	30,650	35,700	45,100	------	------	------	------
AUGUSTA :							
DETACHED AND SEMIDETACHED	29,200	34,650	38,350	46,100	55,300	61,550	64,200
ROW DWELLINGS	26,150	31,050	34,600	41,500	49,800	55,450	57,750
WALKUP	23,450	29,000	33,150	38,900	45,300	49,800	52,350
ELEVATOR-STRUCTURE	30,900	36,000	45,600	------	------	------	------
BRUNSWICK :							
DETACHED AND SEMIDETACHED	29,000	34,500	38,000	45,550	54,900	60,900	63,850
ROW DWELLINGS	25,850	30,850	34,400	41,050	49,500	54,750	57,350
WALKUP	23,100	28,500	32,750	38,650	44,850	49,050	51,800
ELEVATOR-STRUCTURE	31,250	36,450	46,000	------	------	------	------
LEWISTON :							
DETACHED AND SEMIDETACHED	29,000	34,500	38,000	45,550	54,900	60,900	63,850
ROW DWELLINGS	25,850	30,850	34,400	41,050	49,500	54,750	57,350
WALKUP	23,100	28,500	32,750	38,650	44,850	49,050	51,800
ELEVATOR-STRUCTURE	30,000	35,000	44,150	------	------	------	------
PORTLAND :							
DETACHED AND SEMIDETACHED	29,000	34,500	38,000	45,550	54,900	60,900	63,850
ROW DWELLINGS	25,850	30,850	34,400	41,050	49,500	54,750	57,350
WALKUP	23,500	29,150	33,200	39,250	45,600	49,900	52,600
ELEVATOR-STRUCTURE	30,000	34,950	44,150	------	------	------	------
WATERVILLE :							
DETACHED AND SEMIDETACHED	27,950	33,350	36,850	44,150	53,200	58,900	61,600
ROW DWELLINGS	25,250	30,000	33,200	39,700	47,950	53,200	55,600
WALKUP	22,450	27,850	31,700	37,350	43,300	47,550	50,100
ELEVATOR-STRUCTURE	30,200	35,400	44,650	------	------	------	------
MASSACHUSETTS							
BOSTON :							
DETACHED AND SEMIDETACHED	29,100	34,500	38,200	45,750	55,000	61,100	64,000
ROW DWELLINGS	27,450	32,700	36,400	43,400	52,350	58,150	60,750
WALKUP	28,300	33,800	37,400	44,650	53,850	59,700	62,650
ELEVATOR-STRUCTURE	41,350	48,100	60,900	------	------	------	------
WORCESTER :							
DETACHED AND SEMIDETACHED	27,750	33,050	36,700	43,700	52,800	58,600	61,400
ROW DWELLINGS	26,350	31,500	35,050	41,600	50,250	55,850	58,300
WALKUP	26,900	32,400	36,000	42,600	51,400	57,150	59,900
ELEVATOR-STRUCTURE	40,200	47,100	59,300	------	------	------	------
FALL RIVER :							
DETACHED AND SEMIDETACHED	28,150	33,700	37,400	44,550	53,650	59,700	62,400
ROW DWELLINGS	26,850	31,850	35,700	42,450	51,000	56,800	59,450
WALKUP	27,600	32,550	36,600	43,550	52,650	58,600	61,300
ELEVATOR-STRUCTURE	38,650	44,950	56,950	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION I--CONTINUED							
NEW HAMPSHIRE							
MANCHESTER :							
DETACHED AND SEMIDETACHED	25,250	31,400	34,700	41,550	49,800	55,500	58,300
ROW DWELLINGS	23,950	28,950	32,050	38,000	45,750	51,050	53,300
WALKUP	20,950	26,000	29,600	35,000	40,500	44,400	46,850
ELEVATOR-STRUCTURE	30,900	36,000	45,400	------	------	------	------
CONCORD :							
DETACHED AND SEMIDETACHED	27,200	33,750	37,300	44,500	53,400	59,500	62,500
ROW DWELLINGS	25,550	30,750	34,200	40,550	49,050	54,500	56,850
WALKUP	21,900	27,150	30,750	36,450	42,250	46,350	48,850
ELEVATOR-STRUCTURE	30,800	36,000	45,350	------	------	------	------
DOVER :							
DETACHED AND SEMIDETACHED	24,750	30,500	33,850	40,400	48,450	54,050	56,750
ROW DWELLINGS	23,200	27,900	31,050	36,800	44,300	49,300	51,450
WALKUP	20,200	25,000	28,550	33,800	42,200	47,000	48,400
ELEVATOR-STRUCTURE	31,700	36,700	46,450	------	------	------	------
KEENE :							
DETACHED AND SEMIDETACHED	25,950	32,250	35,500	42,550	51,000	56,750	59,650
ROW DWELLINGS	24,500	29,500	32,800	38,950	46,950	52,500	54,550
WALKUP	21,500	26,550	30,150	35,950	41,550	45,500	47,750
ELEVATOR-STRUCTURE	28,250	34,150	43,100	------	------	------	------
NASHUA :							
DETACHED AND SEMIDETACHED	25,250	31,400	34,700	41,550	49,800	55,500	58,300
ROW DWELLINGS	23,950	28,950	32,050	38,000	45,750	51,050	53,300
WALKUP	21,600	26,650	30,450	35,950	41,600	45,850	48,200
ELEVATOR-STRUCTURE	31,050	36,100	45,400	------	------	------	------
PORTSMOUTH :							
DETACHED AND SEMIDETACHED	26,600	32,800	36,350	43,500	52,300	58,150	61,050
ROW DWELLINGS	25,200	30,150	33,700	39,950	47,850	53,350	55,900
WALKUP	19,700	24,450	27,900	33,000	38,050	41,800	43,900
ELEVATOR-STRUCTURE	31,600	36,650	46,400	------	------	------	------
RHODE ISLAND							
PROVIDENCE :							
DETACHED AND SEMIDETACHED	31,650	37,750	41,550	49,850	60,000	66,750	69,850
ROW DWELLINGS	27,700	32,950	36,900	43,750	52,550	58,600	61,400
WALKUP	24,500	30,300	34,150	40,800	46,950	51,700	54,250
ELEVATOR-STRUCTURE	32,650	38,000	48,200	------	------	------	------
VERMONT							
BURLINGTON :							
DETACHED AND SEMIDETACHED	25,900	31,050	34,250	40,950	49,300	54,750	57,350
ROW DWELLINGS	24,150	28,550	31,850	37,900	45,300	50,700	53,100
WALKUP	21,150	26,000	29,800	35,200	40,700	44,900	47,250
ELEVATOR-STRUCTURE	31,000	36,100	45,800	------	------	------	------
BENNINGTON :							
DETACHED AND SEMIDETACHED	25,900	31,050	34,250	40,950	49,300	54,750	57,350
ROW DWELLINGS	24,150	28,550	31,850	37,900	45,300	50,700	53,100
WALKUP	21,150	26,000	29,800	35,200	40,700	44,900	47,250
ELEVATOR-STRUCTURE	31,350	36,500	46,300	------	------	------	------
BRATTLEBORO :							
DETACHED AND SEMIDETACHED	25,900	31,050	34,250	40,950	49,300	54,750	57,350
ROW DWELLINGS	24,150	28,550	31,850	37,900	45,300	50,700	53,100
WALKUP	21,150	26,000	29,800	35,200	40,700	44,900	47,250
ELEVATOR-STRUCTURE	31,350	36,500	46,300	------	------	------	------
MONTPELIER :							
DETACHED AND SEMIDETACHED	25,450	30,300	33,650	40,050	48,200	53,500	56,050
ROW DWELLINGS	23,350	27,800	30,850	36,750	44,000	49,200	51,500
WALKUP	20,550	25,350	28,850	34,200	39,300	43,550	45,700
ELEVATOR-STRUCTURE	31,350	36,500	46,300	------	------	------	------
RUTLAND :							
DETACHED AND SEMIDETACHED	25,600	30,450	33,750	40,500	48,500	54,100	56,550
ROW DWELLINGS	23,750	28,150	31,300	37,200	44,600	49,900	52,050
WALKUP	20,650	25,450	29,100	34,650	39,900	44,100	46,450
ELEVATOR-STRUCTURE	31,550	36,700	46,350	------	------	------	------
REGION II							
NEW JERSEY							
CAMDEN :							
DETACHED AND SEMIDETACHED	26,800	32,200	35,700	42,500	51,400	57,050	59,900
ROW DWELLINGS	21,150	25,250	27,950	33,400	39,900	44,600	46,650
WALKUP	23,400	28,950	33,000	39,150	45,400	49,800	52,700
ELEVATOR-STRUCTURE	33,300	38,750	49,150	------	------	------	------
ATLANTIC CITY :							
DETACHED AND SEMIDETACHED	26,400	31,750	35,100	41,900	50,800	56,050	58,850
ROW DWELLINGS	20,600	24,650	27,400	32,550	39,000	43,700	45,450
WALKUP	22,900	28,450	32,450	38,250	44,500	48,950	51,600
ELEVATOR-STRUCTURE	31,800	36,950	46,800	------	------	------	------
BURLINGTON :							
DETACHED AND SEMIDETACHED	26,750	32,050	35,700	42,350	51,150	56,750	59,650
ROW DWELLINGS	20,950	25,050	27,950	33,050	39,650	44,300	46,150
WALKUP	23,600	29,050	33,000	39,100	45,250	49,750	52,600
ELEVATOR-STRUCTURE	33,450	39,050	49,400	------	------	------	------
GLOUCESTER :							
DETACHED AND SEMIDETACHED	26,400	31,750	35,100	41,900	50,650	56,200	59,000
ROW DWELLINGS	20,800	24,800	27,400	32,800	39,150	43,800	45,750
WALKUP	23,100	28,650	32,450	38,300	44,550	49,100	51,650
ELEVATOR-STRUCTURE	33,300	38,750	49,150	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
	REGION II--CONTINUED						
NEW JERSEY --CONTINUED							
TRENTON :							
DETACHED AND SEMIDETACHED	26,900	32,000	35,700	42,450	51,150	56,900	59,650
ROW DWELLINGS	21,050	25,000	27,950	33,150	39,800	44,350	46,500
WALKUP	23,650	29,250	33,000	39,350	45,450	50,000	52,650
ELEVATOR-STRUCTURE	36,750	42,600	54,000	------	------	------	------
VINELAND :							
DETACHED AND SEMIDETACHED	26,850	32,150	35,700	42,450	51,300	57,050	59,750
ROW DWELLINGS	20,950	25,150	27,950	33,200	39,800	44,400	46,500
WALKUP	23,400	29,000	33,000	39,050	45,000	49,700	52,450
ELEVATOR-STRUCTURE	34,400	39,950	50,700	------	------	------	------
NEWARK :							
DETACHED AND SEMIDETACHED	31,150	36,850	41,100	49,100	58,950	65,350	68,450
ROW DWELLINGS	27,450	32,650	36,250	43,050	51,900	57,900	60,550
WALKUP	26,350	32,850	37,400	44,250	51,350	56,400	59,600
ELEVATOR-STRUCTURE	34,950	40,600	51,250	------	------	------	------
ASBURY PARK :							
DETACHED AND SEMIDETACHED	31,150	36,850	41,100	49,100	58,950	65,350	68,450
ROW DWELLINGS	27,450	32,650	36,250	43,050	51,900	57,900	60,550
WALKUP	25,900	32,250	36,650	43,350	50,400	55,350	58,300
ELEVATOR-STRUCTURE	33,400	38,900	49,100	------	------	------	------
NORTH BERGEN :							
DETACHED AND SEMIDETACHED	31,150	36,850	41,100	49,100	58,950	65,350	68,450
ROW DWELLINGS	27,450	32,650	36,250	43,050	51,900	57,900	60,550
WALKUP	27,100	33,500	38,150	45,250	52,650	57,800	60,750
ELEVATOR-STRUCTURE	35,000	40,750	51,500	------	------	------	------
FREEHOLD :							
DETACHED AND SEMIDETACHED	31,150	36,850	41,100	49,100	58,950	65,350	68,450
ROW DWELLINGS	27,450	32,650	36,250	43,050	51,900	57,900	60,550
WALKUP	25,850	32,250	36,600	43,300	50,200	55,300	58,200
ELEVATOR-STRUCTURE	33,650	39,100	49,350	------	------	------	------
NEW YORK							
ALBANY :							
DETACHED AND SEMIDETACHED	25,450	30,400	33,500	39,950	48,400	53,600	56,250
ROW DWELLINGS	22,250	26,900	29,950	35,600	42,800	47,700	49,950
WALKUP	21,150	26,400	29,900	35,550	41,100	45,100	47,500
ELEVATOR-STRUCTURE	28,650	33,100	42,150	------	------	------	------
PLATTSBURGH :							
DETACHED AND SEMIDETACHED	24,100	28,850	32,000	38,150	46,050	51,050	53,600
ROW DWELLINGS	21,650	25,700	28,550	33,950	40,750	45,450	47,400
WALKUP	20,350	24,900	28,550	33,750	39,200	42,950	45,300
ELEVATOR-STRUCTURE	25,650	31,700	40,050	------	------	------	------
SYRACUSE :							
DETACHED AND SEMIDETACHED	25,550	30,600	33,700	40,350	48,750	54,100	56,650
ROW DWELLINGS	22,750	27,200	30,150	35,850	43,100	48,200	50,400
WALKUP	21,500	26,500	30,100	35,800	41,500	45,400	47,950
ELEVATOR-STRUCTURE	28,650	33,300	42,150	------	------	------	------
POUGHKEEPSIE :							
DETACHED AND SEMIDETACHED	26,750	31,950	35,450	42,300	51,050	56,600	59,300
ROW DWELLINGS	25,550	30,150	33,700	40,100	48,200	53,750	56,200
WALKUP	22,800	28,350	32,150	38,250	44,100	48,500	51,050
ELEVATOR-STRUCTURE	28,800	33,450	42,400	------	------	------	------
BINGHAMTON :							
DETACHED AND SEMIDETACHED	25,400	30,000	33,400	39,900	48,150	53,450	56,000
ROW DWELLINGS	23,000	27,550	30,500	36,350	43,650	48,800	50,900
WALKUP	21,100	26,200	29,800	35,200	40,850	44,700	47,250
ELEVATOR-STRUCTURE	28,750	33,350	42,250	------	------	------	------
BUFFALO :							
DETACHED AND SEMIDETACHED	26,200	31,300	34,750	41,450	49,950	55,600	58,200
ROW DWELLINGS	22,400	26,650	29,550	35,250	42,300	47,300	49,250
WALKUP	21,200	26,000	29,500	34,850	40,350	44,450	46,750
ELEVATOR-STRUCTURE	30,400	35,600	44,750	------	------	------	------
ROCHESTER :							
DETACHED AND SEMIDETACHED	25,650	30,600	33,800	40,450	48,850	54,050	56,700
ROW DWELLINGS	21,800	26,050	29,000	34,350	41,200	45,950	48,100
WALKUP	20,450	25,150	28,700	33,900	39,350	43,200	45,600
ELEVATOR-STRUCTURE	29,700	34,700	43,700	------	------	------	------
JAMESTOWN :							
DETACHED AND SEMIDETACHED	25,450	30,400	33,750	40,350	48,550	53,950	56,600
ROW DWELLINGS	21,650	25,950	28,650	34,050	41,050	45,900	47,750
WALKUP	20,450	25,150	28,700	33,900	39,350	43,200	45,600
ELEVATOR-STRUCTURE	29,550	34,400	43,550	------	------	------	------
ELMIRA :							
DETACHED AND SEMIDETACHED	27,200	32,450	36,200	43,200	52,050	57,700	60,600
ROW DWELLINGS	23,150	27,850	30,800	36,550	43,950	49,100	51,150
WALKUP	21,950	27,000	30,600	36,400	42,000	46,350	48,750
ELEVATOR-STRUCTURE	31,700	36,900	46,550	------	------	------	------
NEW YORK CITY (INNER) :							
DETACHED AND SEMIDETACHED	30,850	37,100	41,050	49,000	59,000	65,600	68,750
ROW DWELLINGS	29,650	35,350	39,250	46,650	55,950	62,400	65,400
WALKUP	31,950	39,750	45,000	53,300	61,800	67,850	71,550
ELEVATOR-STRUCTURE	44,450	48,000	54,550	65,450	75,850	80,750	------
NEW YORK CITY (METRO) :							
DETACHED AND SEMIDETACHED	26,300	30,150	34,150	40,500	46,850	49,200	51,650
ROW DWELLINGS	24,950	28,500	32,400	38,350	44,400	46,600	48,950
WALKUP	27,150	31,100	35,350	41,800	48,400	50,800	53,350
ELEVATOR-STRUCTURE	43,500	47,000	53,450	64,100	74,300	79,050	------
NASSAU COUNTY :							
DETACHED AND SEMIDETACHED	26,300	30,150	34,150	40,500	46,850	49,200	51,650
ROW DWELLINGS	24,950	28,500	32,400	38,350	44,400	46,600	48,950
WALKUP	27,150	31,100	35,350	41,800	48,400	50,800	53,350
ELEVATOR-STRUCTURE	37,950	43,500	49,450	59,400	68,800	73,250	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION II--CONTINUED							
NEW YORK --CONTINUED							
SUFFOLK COUNTY							
DETACHED AND SEMIDETACHED	23,600	26,100	29,000	34,550	41,600	43,750	45,900
ROW DWELLINGS	22,650	24,900	27,650	32,950	39,450	41,400	43,450
WALKUP	24,300	27,750	31,650	37,350	43,200	47,600	50,100
ELEVATOR-STRUCTURE	35,350	40,600	46,150	55,250	64,100	68,250	------
WESTCHESTER COUNTY							
DETACHED AND SEMIDETACHED	24,800	27,450	30,400	36,450	43,000	45,150	47,450
ROW DWELLINGS	23,750	26,150	29,050	34,650	41,500	43,600	45,800
WALKUP	25,650	29,500	33,400	39,550	45,900	48,150	50,550
ELEVATOR-STRUCTURE	37,650	45,750	48,950	58,600	67,950	------	------
ORANGE COUNTY							
DETACHED AND SEMIDETACHED	21,600	24,600	27,300	32,600	39,250	41,250	43,300
ROW DWELLINGS	20,750	23,450	26,100	30,800	37,250	39,050	41,050
WALKUP	23,200	27,450	31,200	36,900	42,700	47,050	49,550
ELEVATOR-STRUCTURE	34,250	39,500	44,850	53,850	62,600	66,650	------
ROCKLAND COUNTY							
DETACHED AND SEMIDETACHED	23,050	25,500	28,350	33,850	40,750	42,800	44,950
ROW DWELLINGS	22,100	24,400	27,150	32,150	38,650	40,550	42,600
WALKUP	23,750	27,250	30,900	36,600	42,450	46,600	49,100
ELEVATOR-STRUCTURE	36,300	38,850	44,100	52,950	61,400	65,300	------
PUERTO RICO							
SAN JUAN							
DETACHED AND SEMIDETACHED	20,150	24,050	26,700	31,850	38,400	42,550	44,750
ROW DWELLINGS	19,900	23,800	26,500	31,150	37,700	41,850	43,900
WALKUP	16,800	20,850	23,650	28,150	32,500	35,800	37,700
ELEVATOR-STRUCTURE	19,750	23,200	29,200	32,500	35,600	------	------
OLD SAN JUAN							
DETACHED AND SEMIDETACHED	24,050	28,900	31,900	38,150	46,050	51,050	53,600
ROW DWELLINGS	23,850	28,550	31,800	37,550	45,300	50,300	52,750
WALKUP	20,250	24,950	28,350	33,750	38,950	42,950	45,300
ELEVATOR-STRUCTURE	23,650	27,700	35,050	39,050	42,800	------	------
PONCE							
DETACHED AND SEMIDETACHED	20,200	24,200	26,750	32,000	38,450	42,650	44,800
ROW DWELLINGS	20,000	23,950	26,600	31,200	37,800	41,950	44,000
WALKUP	17,000	20,900	23,750	28,150	32,650	35,850	37,750
ELEVATOR-STRUCTURE	19,900	23,250	29,350	32,600	35,750	------	------
MAYAGUEZ							
DETACHED AND SEMIDETACHED	20,200	24,200	26,750	32,000	38,450	42,650	44,800
ROW DWELLINGS	20,000	23,950	26,600	31,200	37,800	41,950	44,000
WALKUP	17,000	20,900	23,750	28,150	32,650	35,850	37,750
ELEVATOR-STRUCTURE	19,900	23,250	29,350	32,600	35,750	------	------
ARECIBO							
DETACHED AND SEMIDETACHED	20,200	24,200	26,750	32,000	38,450	42,650	44,800
ROW DWELLINGS	20,000	23,950	26,600	31,200	37,800	41,950	44,000
WALKUP	17,000	20,900	23,750	28,150	32,650	35,850	37,750
ELEVATOR-STRUCTURE	19,900	23,250	29,350	32,600	35,750	------	------
VIRGIN ISLANDS							
ST. THOMAS							
DETACHED AND SEMIDETACHED	24,600	29,500	32,650	39,050	47,000	52,200	54,750
ROW DWELLINGS	24,400	29,050	32,250	38,400	46,100	51,350	53,850
WALKUP	20,950	25,700	29,250	34,650	40,250	44,150	46,500
ELEVATOR-STRUCTURE	23,300	27,100	34,500	38,250	42,050	------	------
ST. CROIX							
DETACHED AND SEMIDETACHED	24,000	28,650	31,850	38,150	45,750	50,900	53,250
ROW DWELLINGS	23,850	28,500	31,650	37,550	45,100	50,250	52,600
WALKUP	20,200	24,900	28,250	33,400	38,850	42,800	44,950
ELEVATOR-STRUCTURE	22,700	26,500	33,500	37,300	40,950	------	------
REGION III							
DELAWARE							
WILMINGTON							
DETACHED AND SEMIDETACHED	27,050	32,450	35,950	42,950	51,600	57,550	60,250
ROW DWELLINGS	22,400	26,700	29,450	35,200	42,550	47,200	49,550
WALKUP	20,800	25,450	28,950	34,650	40,100	43,750	46,150
ELEVATOR-STRUCTURE	30,700	35,650	45,500	------	------	------	------
DOVER							
DETACHED AND SEMIDETACHED	26,700	32,350	35,700	42,550	51,100	57,100	59,650
ROW DWELLINGS	22,000	26,350	29,250	34,750	42,150	46,700	48,850
WALKUP	20,450	25,200	28,700	34,050	39,500	43,300	45,550
ELEVATOR-STRUCTURE	30,600	35,550	45,200	------	------	------	------
WASHINGTON, D.C.							
WASHINGTON, D.C.							
DETACHED AND SEMIDETACHED	26,500	31,750	35,050	41,900	50,450	56,250	58,700
ROW DWELLINGS	23,100	27,650	30,550	36,450	43,900	48,950	51,050
WALKUP	20,150	24,700	28,400	33,350	38,750	42,800	44,900
ELEVATOR-STRUCTURE	30,300	34,950	44,400	------	------	------	------
MARYLAND							
BALTIMORE							
DETACHED AND SEMIDETACHED	23,350	28,100	31,100	37,100	44,550	49,950	52,050
ROW DWELLINGS	18,850	22,750	25,050	29,950	35,950	39,900	41,900
WALKUP	18,150	22,400	25,450	30,150	35,000	38,350	40,450
ELEVATOR-STRUCTURE	27,950	32,450	41,200	------	------	------	------
BALTIMORE CITY							
DETACHED AND SEMIDETACHED	25,150	30,250	33,500	39,900	47,850	53,650	55,950
ROW DWELLINGS	20,400	24,600	27,050	32,350	38,850	43,100	45,200
WALKUP	19,550	24,150	27,450	32,600	37,800	41,450	43,700
ELEVATOR-STRUCTURE	30,250	35,150	44,500	------	------	------	------
HAGERSTOWN							
DETACHED AND SEMIDETACHED	23,300	27,850	30,900	36,950	44,450	49,600	51,750
ROW DWELLINGS	18,700	22,400	24,850	29,700	35,550	39,550	41,450
WALKUP	18,050	22,300	25,250	30,000	34,800	38,200	10,350
ELEVATOR-STRUCTURE	27,850	32,350	40,950	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION III--CONTINUED							
MARYLAND --CONTINUED							
SALISBURY :							
DETACHED AND SEMIDETACHED	23,650	28,350	31,400	37,500	45,050	50,200	52,550
ROW DWELLINGS	19,200	22,850	25,250	30,200	36,350	40,400	42,250
WALKUP	18,350	22,700	25,700	30,550	35,400	38,750	40,900
ELEVATOR-STRUCTURE	28,300	32,950	41,600	------	------	------	------
WALDORF :							
DETACHED AND SEMIDETACHED	24,350	29,300	32,450	38,600	46,350	51,900	54,150
ROW DWELLINGS	19,600	23,650	26,050	31,200	37,400	41,600	43,600
WALKUP	18,900	23,400	26,500	31,450	36,500	40,100	42,200
ELEVATOR-STRUCTURE	23,550	27,450	34,800	------	------	------	------
PENNSYLVANIA							
PHILADELPHIA :							
DETACHED AND SEMIDETACHED	28,150	34,100	36,850	44,900	53,800	60,100	62,600
ROW DWELLINGS	24,350	29,300	32,400	38,500	46,350	51,700	53,650
WALKUP	21,850	27,100	30,800	36,350	42,150	46,550	48,800
ELEVATOR-STRUCTURE	34,050	39,500	50,100	------	------	------	------
ALLENTOWN :							
DETACHED AND SEMIDETACHED	26,750	32,050	35,350	42,350	50,850	56,700	59,300
ROW DWELLINGS	22,700	27,250	30,100	35,900	43,100	48,000	50,050
WALKUP	21,800	27,000	30,700	36,350	42,050	46,350	48,650
ELEVATOR-STRUCTURE	30,800	35,700	45,150	------	------	------	------
BELLEFONTE :							
DETACHED AND SEMIDETACHED	26,550	32,050	35,550	42,350	50,850	56,750	59,300
ROW DWELLINGS	22,650	27,200	30,150	35,900	43,100	48,100	49,900
WALKUP	21,900	27,100	30,800	36,300	42,150	46,450	48,650
ELEVATOR-STRUCTURE	32,200	37,300	47,550	------	------	------	------
WELLSBORO :							
DETACHED AND SEMIDETACHED	27,300	32,600	36,250	43,200	52,000	57,700	60,550
ROW DWELLINGS	22,950	27,650	30,550	36,200	43,550	48,700	50,750
WALKUP	22,400	27,600	31,200	37,100	42,900	47,300	49,700
ELEVATOR-STRUCTURE	39,500	46,100	58,050	------	------	------	------
HARRISBURG :							
DETACHED AND SEMIDETACHED	26,400	31,950	35,300	42,000	50,500	56,300	58,800
ROW DWELLINGS	22,500	26,950	29,850	35,450	42,700	47,550	49,550
WALKUP	21,600	26,750	30,450	36,000	41,850	46,000	48,250
ELEVATOR-STRUCTURE	30,900	35,950	45,500	------	------	------	------
LANCASTER :							
DETACHED AND SEMIDETACHED	25,850	31,350	34,450	41,100	49,550	55,300	57,700
ROW DWELLINGS	22,000	26,400	29,050	34,700	41,800	46,500	48,400
WALKUP	21,200	26,150	29,800	35,300	40,950	45,100	47,300
ELEVATOR-STRUCTURE	30,500	35,300	44,750	------	------	------	------
YORK :							
DETACHED AND SEMIDETACHED	25,850	31,350	34,450	41,100	49,550	55,300	57,700
ROW DWELLINGS	22,000	26,400	29,050	34,650	41,800	46,500	48,400
WALKUP	21,200	26,150	29,800	35,300	40,950	45,100	47,300
ELEVATOR-STRUCTURE	30,500	35,300	44,750	------	------	------	------
READING :							
DETACHED AND SEMIDETACHED	26,200	31,800	34,950	41,750	50,200	56,050	58,550
ROW DWELLINGS	22,350	26,850	29,600	35,300	42,450	47,250	49,150
WALKUP	21,400	26,450	30,200	35,600	41,350	45,550	47,650
ELEVATOR-STRUCTURE	30,500	35,300	44,750	------	------	------	------
SCRANTON :							
DETACHED AND SEMIDETACHED	27,250	32,900	36,250	43,200	52,000	57,900	60,500
ROW DWELLINGS	22,400	26,800	29,600	35,350	42,350	47,350	49,200
WALKUP	19,300	23,750	26,950	31,900	37,050	40,750	42,700
ELEVATOR-STRUCTURE	32,500	37,700	47,950	------	------	------	------
PITTSBURGH :							
DETACHED AND SEMIDETACHED	28,500	34,100	37,800	44,850	53,900	60,100	62,800
ROW DWELLINGS	25,300	30,350	33,550	39,900	48,100	53,450	55,950
WALKUP	25,700	30,750	34,050	40,550	48,800	54,200	56,750
ELEVATOR-STRUCTURE	32,700	38,150	48,300	------	------	------	------
ALTOONA :							
DETACHED AND SEMIDETACHED	27,300	32,750	36,350	43,300	51,800	57,900	60,400
ROW DWELLINGS	24,450	29,500	32,400	38,750	46,500	51,850	54,200
WALKUP	23,200	28,550	32,900	38,700	44,750	49,300	51,800
ELEVATOR-STRUCTURE	31,800	36,900	46,550	------	------	------	------
ERIE :							
DETACHED AND SEMIDETACHED	27,900	33,400	36,950	44,000	52,950	59,000	61,600
ROW DWELLINGS	25,250	30,350	33,300	39,500	47,800	53,400	55,600
WALKUP	23,500	29,050	33,300	39,300	45,650	50,350	52,850
ELEVATOR-STRUCTURE	32,150	37,300	47,250	------	------	------	------
JOHNSTOWN :							
DETACHED AND SEMIDETACHED	27,300	32,750	36,350	43,250	51,850	57,950	60,500
ROW DWELLINGS	24,550	29,400	32,400	38,500	46,600	51,750	54,050
WALKUP	23,200	28,750	32,900	38,750	44,950	49,550	52,050
ELEVATOR-STRUCTURE	31,650	36,800	46,550	------	------	------	------
VIRGINIA							
RICHMOND :							
DETACHED AND SEMIDETACHED	19,250	23,200	28,550	34,150	41,150	45,700	47,700
ROW DWELLINGS	16,650	20,150	24,800	29,600	35,700	39,600	41,300
WALKUP	15,500	19,450	24,450	28,900	33,400	36,750	38,800
ELEVATOR-STRUCTURE	31,350	36,400	46,050	------	------	------	------
NORFOLK :							
DETACHED AND SEMIDETACHED	18,000	21,700	26,600	31,750	38,250	42,600	44,500
ROW DWELLINGS	15,450	18,800	23,150	27,650	33,250	36,950	38,500
WALKUP	13,800	17,100	21,750	25,600	29,550	32,700	34,200
ELEVATOR-STRUCTURE	26,500	31,000	39,100	------	------	------	------
NEWPORT NEWS :							
DETACHED AND SEMIDETACHED	17,200	20,700	25,450	30,400	36,600	40,650	42,400
ROW DWELLINGS	14,750	18,000	22,050	26,350	31,750	35,350	36,850
WALKUP	14,100	17,600	22,300	26,350	30,550	33,800	35,450
ELEVATOR-STRUCTURE	26,800	31,200	39,300	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION III--CONTINUED							
VIRGINIA --CONTINUED							
HARRISONBURG :							
DETACHED AND SEMIDETACHED	17,300	20,800	25,600	30,550	36,800	40,950	42,600
ROW DWELLINGS	14,800	18,050	22,100	26,500	31,850	35,550	36,950
WALKUP	13,900	17,300	22,050	25,850	30,150	33,150	34,850
ELEVATOR-STRUCTURE	24,500	28,500	36,050	------	------	------	------
NORTON :							
DETACHED AND SEMIDETACHED	19,800	23,900	29,350	35,250	42,400	47,050	49,100
ROW DWELLINGS	17,550	21,250	26,000	31,150	37,500	41,750	43,600
WALKUP	16,750	20,600	26,300	30,800	35,900	39,500	41,350
ELEVATOR-STRUCTURE	27,700	32,050	40,650	------	------	------	------
CHARLOTTESVILLE :							
DETACHED AND SEMIDETACHED	20,050	24,150	29,800	35,300	42,750	47,600	49,550
ROW DWELLINGS	17,200	20,900	25,700	30,850	37,150	41,250	42,950
WALKUP	16,150	20,100	26,650	30,150	34,950	38,550	40,600
ELEVATOR-STRUCTURE	28,450	33,050	41,950	------	------	------	------
WEST VIRGINIA							
CHARLESTON :							
DETACHED AND SEMIDETACHED	21,600	26,150	32,450	38,550	46,400	51,900	54,000
ROW DWELLINGS	19,300	23,250	28,650	34,250	41,000	45,700	47,700
WALKUP	18,600	23,150	29,500	34,800	40,750	44,500	46,700
ELEVATOR-STRUCTURE	31,950	37,000	47,050	------	------	------	------
BLUEFIELD :							
DETACHED AND SEMIDETACHED	21,150	25,600	31,450	37,600	45,200	50,500	52,450
ROW DWELLINGS	18,700	22,700	27,900	33,300	39,950	44,700	46,700
WALKUP	18,150	22,550	28,850	33,900	39,200	43,350	45,500
ELEVATOR-STRUCTURE	31,050	36,150	45,800	------	------	------	------
HUNTINGTON :							
DETACHED AND SEMIDETACHED	21,350	25,750	31,700	37,750	45,700	50,950	53,050
ROW DWELLINGS	18,750	22,800	28,300	33,600	40,250	45,050	46,950
WALKUP	18,400	22,750	28,950	34,300	39,700	43,800	45,900
ELEVATOR-STRUCTURE	31,450	36,500	46,400	------	------	------	------
PARKERSBURG :							
DETACHED AND SEMIDETACHED	21,800	26,300	32,500	38,750	46,650	52,150	54,350
ROW DWELLINGS	19,400	23,500	28,850	34,500	41,200	45,950	47,950
WALKUP	18,400	22,750	28,950	34,300	39,700	43,800	45,900
ELEVATOR-STRUCTURE	31,450	36,500	46,400	------	------	------	------
WHEELING :							
DETACHED AND SEMIDETACHED	21,150	25,600	31,450	37,600	45,200	50,500	52,450
ROW DWELLINGS	18,700	22,700	27,900	33,300	39,950	44,700	46,700
WALKUP	18,150	22,550	28,850	33,900	39,200	43,350	45,500
ELEVATOR-STRUCTURE	31,050	36,150	45,800	------	------	------	------
MARTINSBURG :							
DETACHED AND SEMIDETACHED	19,650	23,900	29,450	35,100	42,150	47,000	49,050
ROW DWELLINGS	17,600	21,150	25,950	30,800	37,350	41,450	43,450
WALKUP	16,650	20,800	26,550	31,150	36,200	40,000	42,050
ELEVATOR-STRUCTURE	31,050	36,150	45,800	------	------	------	------
FAIRMONT :							
DETACHED AND SEMIDETACHED	21,700	26,150	32,400	38,550	46,400	51,900	54,000
ROW DWELLINGS	19,300	23,250	28,650	34,250	41,000	45,700	47,850
WALKUP	18,000	22,350	28,300	33,550	38,700	42,850	45,000
ELEVATOR-STRUCTURE	31,000	36,150	45,650	------	------	------	------
POINT PLEASANT :							
DETACHED AND SEMIDETACHED	20,300	24,600	30,350	36,200	43,500	48,500	50,600
ROW DWELLINGS	17,950	21,850	26,900	32,000	38,450	42,800	44,900
WALKUP	17,550	21,850	27,800	32,600	37,850	41,800	43,800
ELEVATOR-STRUCTURE	31,400	36,350	46,150	------	------	------	------
REGION IV							
ALABAMA							
BIRMINGHAM :							
DETACHED AND SEMIDETACHED	16,600	20,250	24,850	29,850	35,950	39,850	41,700
ROW DWELLINGS	14,850	17,700	21,950	26,150	31,500	35,000	36,700
WALKUP	13,750	16,950	21,450	25,300	29,400	32,550	34,050
ELEVATOR-STRUCTURE	26,400	30,950	38,850	------	------	------	------
DOTHAN :							
DETACHED AND SEMIDETACHED	15,850	19,300	23,750	28,600	34,250	37,950	39,900
ROW DWELLINGS	14,550	17,600	21,600	25,650	31,000	34,500	36,150
WALKUP	12,950	16,250	20,550	24,350	28,200	31,000	32,700
ELEVATOR-STRUCTURE	25,650	29,950	37,750	------	------	------	------
FLORENCE :							
DETACHED AND SEMIDETACHED	16,100	19,500	23,800	28,850	34,550	38,400	40,150
ROW DWELLINGS	14,450	17,450	21,450	25,900	31,050	34,450	36,050
WALKUP	13,000	16,300	20,600	24,500	28,400	31,150	32,800
ELEVATOR-STRUCTURE	26,150	30,700	38,600	------	------	------	------
HUNTSVILLE :							
DETACHED AND SEMIDETACHED	15,700	19,050	23,550	28,000	33,800	37,600	39,350
ROW DWELLINGS	14,100	16,800	20,900	24,850	29,950	33,400	34,900
WALKUP	12,900	16,100	20,350	23,950	27,800	30,650	32,150
ELEVATOR-STRUCTURE	25,650	29,950	37,900	------	------	------	------
MOBILE :							
DETACHED AND SEMIDETACHED	17,450	21,100	26,050	31,050	37,450	41,600	43,450
ROW DWELLINGS	15,350	18,700	23,000	27,300	32,850	36,550	38,300
WALKUP	13,800	17,200	21,800	25,750	30,000	33,100	34,850
ELEVATOR-STRUCTURE	27,050	31,450	39,600	------	------	------	------
MONTGOMERY :							
DETACHED AND SEMIDETACHED	15,800	19,200	23,650	28,550	34,200	37,900	39,800
ROW DWELLINGS	14,100	17,000	20,950	24,850	30,050	33,400	35,000
WALKUP	12,950	16,200	20,500	24,250	28,150	30,800	32,550
ELEVATOR-STRUCTURE	25,950	30,400	38,100	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION IV--CONTINUED							
ALABAMA --CONTINUED							
TUSCALOOSA :							
DETACHED AND SEMIDETACHED	15,700	19,050	23,550	28,000	33,800	37,600	39,350
ROW DWELLINGS	14,000	16,700	20,800	24,700	29,850	33,200	34,700
WALKUP	12,900	16,100	20,350	23,950	27,800	30,650	32,150
ELEVATOR-STRUCTURE	25,650	29,950	37,900	------	------	------	------
FLORIDA							
JACKSONVILLE :							
DETACHED AND SEMIDETACHED	14,350	17,800	22,800	26,750	31,150	33,850	35,550
ROW DWELLINGS	13,750	16,950	21,700	25,500	29,600	32,400	33,950
WALKUP	14,650	18,200	23,350	27,400	31,900	35,000	36,700
ELEVATOR-STRUCTURE	23,300	27,000	34,400	------	------	------	------
PENSACOLA :							
DETACHED AND SEMIDETACHED	14,350	17,700	22,550	26,350	30,850	33,700	35,350
ROW DWELLINGS	13,700	16,850	21,400	25,150	29,350	32,050	33,750
WALKUP	14,650	18,150	23,100	27,050	31,650	34,650	36,350
ELEVATOR-STRUCTURE	22,300	27,000	32,800	------	------	------	------
MIAMI :							
DETACHED AND SEMIDETACHED	17,750	21,250	26,150	31,350	37,750	41,950	43,900
ROW DWELLINGS	15,600	18,850	23,350	27,800	33,300	37,000	38,950
WALKUP	15,650	19,750	25,050	29,800	34,400	37,950	39,900
ELEVATOR-STRUCTURE	26,500	30,800	39,000	------	------	------	------
KEY WEST :							
DETACHED AND SEMIDETACHED	17,750	21,250	26,150	31,350	37,750	41,950	43,900
ROW DWELLINGS	15,600	18,850	23,350	27,800	33,300	37,000	38,950
WALKUP	15,650	19,750	25,050	29,800	34,400	37,950	39,900
ELEVATOR-STRUCTURE	26,500	30,800	39,000	------	------	------	------
TAMPA :							
DETACHED AND SEMIDETACHED	16,550	19,850	24,750	29,550	35,350	39,450	41,250
ROW DWELLINGS	14,800	17,800	22,150	26,400	31,850	35,450	37,100
WALKUP	13,600	17,750	22,500	26,750	31,100	34,100	35,800
ELEVATOR-STRUCTURE	27,350	31,800	40,250	------	------	------	------
ORLANDO :							
DETACHED AND SEMIDETACHED	16,150	19,250	23,800	28,500	34,150	38,150	39,850
ROW DWELLINGS	14,500	17,450	21,500	25,700	30,800	34,350	35,900
WALKUP	15,150	18,950	23,950	28,500	33,000	36,450	38,100
ELEVATOR-STRUCTURE	28,400	32,850	41,350	------	------	------	------
GEORGIA							
ATLANTA :							
DETACHED AND SEMIDETACHED	16,000	19,400	23,750	28,400	34,100	37,850	39,600
ROW DWELLINGS	15,500	18,700	23,200	27,500	33,150	36,850	38,550
WALKUP	15,450	19,050	24,300	28,600	33,250	36,400	38,400
ELEVATOR-STRUCTURE	24,600	28,450	36,200	------	------	------	------
ALBANY :							
DETACHED AND SEMIDETACHED	15,950	19,250	23,600	28,100	33,700	37,500	39,300
ROW DWELLINGS	15,450	18,650	22,950	27,300	32,800	36,650	38,300
WALKUP	15,300	18,950	24,050	28,250	33,050	36,150	38,150
ELEVATOR-STRUCTURE	24,350	28,350	35,800	------	------	------	------
AUGUSTA :							
DETACHED AND SEMIDETACHED	16,400	19,650	24,400	29,100	35,000	38,750	40,600
ROW DWELLINGS	16,100	19,250	23,650	28,450	34,200	37,800	39,650
WALKUP	15,500	19,050	24,300	28,750	33,250	36,800	38,450
ELEVATOR-STRUCTURE	22,900	26,500	33,650	------	------	------	------
BRUNSWICK :							
DETACHED AND SEMIDETACHED	15,000	18,050	22,200	26,550	31,900	35,500	37,000
ROW DWELLINGS	14,450	17,500	21,650	25,700	30,950	34,450	36,150
WALKUP	14,050	17,450	22,100	26,100	30,350	33,300	35,000
ELEVATOR-STRUCTURE	24,350	28,350	35,800	------	------	------	------
COLUMBUS :							
DETACHED AND SEMIDETACHED	15,500	18,700	23,250	27,850	33,500	37,000	38,900
ROW DWELLINGS	15,400	18,500	22,750	27,150	32,600	36,200	37,800
WALKUP	15,200	18,650	23,850	28,000	32,550	35,950	37,550
ELEVATOR-STRUCTURE	24,250	28,150	35,650	------	------	------	------
MACON :							
DETACHED AND SEMIDETACHED	15,850	18,850	23,600	28,050	33,900	37,400	39,200
ROW DWELLINGS	15,500	18,650	22,850	27,300	32,900	36,550	38,250
WALKUP	14,800	18,200	23,100	27,300	31,600	34,950	36,450
ELEVATOR-STRUCTURE	24,250	28,150	35,650	------	------	------	------
ROME :							
DETACHED AND SEMIDETACHED	15,050	18,100	22,500	26,900	32,250	35,750	37,450
ROW DWELLINGS	14,750	17,750	21,900	26,150	31,250	34,800	36,400
WALKUP	14,250	17,550	22,500	26,400	30,550	33,750	35,500
ELEVATOR-STRUCTURE	23,900	27,850	35,300	------	------	------	------
SAVANNAH :							
DETACHED AND SEMIDETACHED	15,000	18,050	22,200	26,550	31,900	35,500	37,000
ROW DWELLINGS	14,450	17,500	21,650	25,700	30,950	34,450	36,150
WALKUP	14,050	17,450	22,100	26,100	30,350	33,300	35,000
ELEVATOR-STRUCTURE	24,350	28,350	35,800	------	------	------	------
VALDOSTA :							
DETACHED AND SEMIDETACHED	15,450	18,600	23,150	27,700	33,250	36,850	38,550
ROW DWELLINGS	15,200	18,300	22,600	26,900	32,200	35,800	37,500
WALKUP	15,050	18,450	23,600	27,800	32,150	35,500	37,100
ELEVATOR-STRUCTURE	23,900	27,850	35,300	------	------	------	------
KENTUCKY							
LOUISVILLE :							
DETACHED AND SEMIDETACHED	17,500	20,900	25,800	30,950	37,250	41,250	43,300
ROW DWELLINGS	17,200	20,550	25,400	30,500	36,650	40,700	42,700
WALKUP	17,500	20,850	25,800	30,950	37,350	41,350	43,400
ELEVATOR-STRUCTURE	31,150	36,300	45,950	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS 0	1	2	3	4	5	6
REGION IV--CONTINUED							
KENTUCKY --CONTINUED							
ASHLAND							
DETACHED AND SEMIDETACHED	18,050	21,550	26,650	31,850	38,400	42,500	44,600
ROW DWELLINGS	17,700	21,200	26,100	31,450	37,750	41,900	44,000
WALKUP	18,000	21,550	26,600	31,900	38,450	42,550	44,650
ELEVATOR-STRUCTURE	32,100	37,550	47,450	------	------	------	------
COVINGTON							
DETACHED AND SEMIDETACHED	18,050	21,550	26,650	31,850	38,400	42,500	44,600
ROW DWELLINGS	17,700	21,200	26,100	31,450	37,750	41,900	44,000
WALKUP	18,000	21,550	26,600	31,900	38,450	42,550	44,650
ELEVATOR-STRUCTURE	32,900	38,450	48,300	------	------	------	------
MIDDLESBORO							
DETACHED AND SEMIDETACHED	20,050	24,000	29,700	35,600	42,850	47,450	49,800
ROW DWELLINGS	19,800	23,650	29,200	35,100	42,200	46,800	49,150
WALKUP	20,100	24,000	29,700	35,650	42,900	47,550	49,900
ELEVATOR-STRUCTURE	31,150	36,300	45,950	------	------	------	------
OWENSBORO							
DETACHED AND SEMIDETACHED	17,500	20,900	25,800	30,950	37,250	41,250	43,300
ROW DWELLINGS	17,200	20,550	25,400	30,500	36,650	40,700	42,700
WALKUP	17,500	20,850	25,800	30,950	37,350	41,350	43,400
ELEVATOR-STRUCTURE	31,500	36,650	46,350	------	------	------	------
PADUCAH							
DETACHED AND SEMIDETACHED	17,650	21,100	26,100	31,200	37,600	41,650	43,800
ROW DWELLINGS	17,350	20,800	25,600	30,800	37,050	41,100	43,100
WALKUP	17,650	21,100	26,100	31,300	37,700	41,800	43,850
ELEVATOR-STRUCTURE	29,500	34,550	43,550	------	------	------	------
MISSISSIPPI							
JACKSON							
DETACHED AND SEMIDETACHED	15,800	19,150	23,600	28,200	34,000	37,700	39,450
ROW DWELLINGS	15,200	18,300	22,450	26,850	32,250	35,650	37,600
WALKUP	13,000	16,200	20,800	24,500	28,300	31,200	32,750
ELEVATOR-STRUCTURE	23,800	27,550	34,900	------	------	------	------
CORINTH							
DETACHED AND SEMIDETACHED	16,100	19,550	24,100	28,800	34,750	38,550	40,300
ROW DWELLINGS	14,850	18,100	22,450	26,600	32,200	35,600	37,350
WALKUP	13,550	16,750	21,350	25,150	29,350	32,050	33,700
ELEVATOR-STRUCTURE	24,300	28,100	35,450	------	------	------	------
GREENVILLE							
DETACHED AND SEMIDETACHED	15,800	19,150	23,600	28,200	34,000	37,700	39,450
ROW DWELLINGS	15,200	18,300	22,450	26,850	32,250	35,650	37,600
WALKUP	13,000	16,200	20,800	24,500	28,300	31,200	32,750
ELEVATOR-STRUCTURE	23,550	27,450	34,800	------	------	------	------
GREENWOOD							
DETACHED AND SEMIDETACHED	15,800	19,150	23,600	28,200	34,000	37,700	39,450
ROW DWELLINGS	15,200	18,300	22,450	26,850	32,250	35,650	37,600
WALKUP	13,550	16,950	21,450	25,300	29,400	32,350	33,950
ELEVATOR-STRUCTURE	23,800	27,550	34,900	------	------	------	------
GULFPORT							
DETACHED AND SEMIDETACHED	15,850	19,250	23,650	28,250	34,050	37,750	39,650
ROW DWELLINGS	15,250	18,350	22,650	26,900	32,300	35,800	37,650
WALKUP	12,800	16,100	20,350	23,850	27,750	30,500	31,850
ELEVATOR-STRUCTURE	24,000	28,000	35,350	------	------	------	------
HATTIESBURG							
DETACHED AND SEMIDETACHED	15,800	19,150	23,600	28,200	34,000	37,700	39,450
ROW DWELLINGS	15,200	18,300	22,450	26,850	32,250	35,650	37,600
WALKUP	13,000	16,200	20,800	24,500	28,300	31,200	32,750
ELEVATOR-STRUCTURE	23,800	27,550	34,900	------	------	------	------
SOUTHAVEN							
DETACHED AND SEMIDETACHED	15,650	18,750	23,350	27,650	33,400	37,000	38,900
ROW DWELLINGS	14,900	18,050	22,250	26,350	31,750	35,250	36,900
WALKUP	13,750	17,150	21,850	25,650	29,800	33,000	34,450
ELEVATOR-STRUCTURE	23,250	27,200	34,400	------	------	------	------
NORTH CAROLINA							
GREENSBORO							
DETACHED AND SEMIDETACHED	15,400	18,400	22,350	26,750	31,850	35,400	36,950
ROW DWELLINGS	14,900	17,500	21,700	25,550	30,700	34,100	35,650
WALKUP	14,400	17,450	22,050	25,950	30,050	32,850	34,600
ELEVATOR-STRUCTURE	24,350	28,400	35,950	------	------	------	------
ASHEVILLE							
DETACHED AND SEMIDETACHED	15,800	18,850	23,100	27,600	32,900	36,500	38,200
ROW DWELLINGS	15,550	18,550	22,650	26,750	32,150	35,800	37,250
WALKUP	15,150	18,750	23,600	27,650	31,900	34,550	36,800
ELEVATOR-STRUCTURE	25,150	29,000	36,700	------	------	------	------
CHARLOTTE							
DETACHED AND SEMIDETACHED	15,600	18,600	22,700	27,100	32,350	35,950	37,500
ROW DWELLINGS	15,150	18,000	22,050	26,050	31,050	34,500	36,100
WALKUP	15,150	18,650	23,550	27,600	31,800	34,800	36,600
ELEVATOR-STRUCTURE	24,350	28,400	35,950	------	------	------	------
DURHAM							
DETACHED AND SEMIDETACHED	15,100	17,950	22,000	26,250	31,350	34,900	36,500
ROW DWELLINGS	14,850	17,500	21,550	25,400	30,600	33,850	35,450
WALKUP	14,250	16,700	22,050	25,900	29,850	32,550	34,400
ELEVATOR-STRUCTURE	24,200	28,350	35,800	------	------	------	------
ELIZABETH CITY							
DETACHED AND SEMIDETACHED	16,550	19,850	24,100	28,750	34,350	38,250	39,800
ROW DWELLINGS	14,750	17,750	21,700	25,900	31,050	34,450	35,900
WALKUP	15,300	18,750	23,750	27,650	31,950	35,300	36,900
ELEVATOR-STRUCTURE	24,750	28,800	36,400	------	------	------	------
GREENVILLE							
DETACHED AND SEMIDETACHED	15,150	18,100	22,050	26,250	31,500	35,000	36,550
ROW DWELLINGS	14,850	17,550	21,650	25,300	30,500	33,800	35,400
WALKUP	13,850	17,100	21,700	25,300	29,150	31,900	33,650
ELEVATOR-STRUCTURE	23,950	27,200	33,800	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION IV--CONTINUED							
NORTH CAROLINA --CONTINUED							
RALEIGH							
DETACHED AND SEMIDETACHED	15,150	18,200	22,100	26,400	31,600	35,000	36,550
ROW DWELLINGS	14,850	17,700	21,550	25,400	30,600	33,850	35,450
WALKUP	14,000	17,350	21,750	25,850	29,750	32,600	34,400
ELEVATOR-STRUCTURE	24,200	28,350	35,800	------	------	------	------
WILMINGTON							
DETACHED AND SEMIDETACHED	14,750	17,750	21,800	26,250	31,600	35,050	36,600
ROW DWELLINGS	14,600	17,350	21,000	24,700	29,500	32,800	34,350
WALKUP	14,900	18,250	23,000	26,800	31,100	34,000	35,650
ELEVATOR-STRUCTURE	24,350	28,050	34,900	------	------	------	------
WINSTON-SALEM							
DETACHED AND SEMIDETACHED	15,550	18,500	22,600	27,000	32,350	35,650	37,450
ROW DWELLINGS	14,700	17,500	21,350	25,200	30,250	33,600	35,050
WALKUP	14,700	18,050	22,700	26,550	30,650	33,400	35,200
ELEVATOR-STRUCTURE	24,200	28,350	35,800	------	------	------	------
FAYETTEVILLE							
DETACHED AND SEMIDETACHED	15,150	18,200	22,100	26,400	31,600	35,000	36,550
ROW DWELLINGS	14,750	17,500	21,350	25,200	30,250	33,600	35,050
WALKUP	14,700	18,050	22,800	26,650	30,850	33,650	35,350
ELEVATOR-STRUCTURE	23,750	27,200	33,750	------	------	------	------
SOUTH CAROLINA							
COLUMBIA							
DETACHED AND SEMIDETACHED	15,450	18,700	23,000	27,500	33,100	36,700	38,500
ROW DWELLINGS	15,500	18,550	22,850	27,100	32,800	36,400	38,100
WALKUP	14,200	17,650	22,450	26,950	30,650	33,650	35,600
ELEVATOR-STRUCTURE	26,300	30,600	38,500	------	------	------	------
AIKEN							
DETACHED AND SEMIDETACHED	15,450	18,700	23,000	27,500	33,050	36,750	38,550
ROW DWELLINGS	15,450	18,550	22,850	27,100	32,800	36,300	38,100
WALKUP	14,800	18,450	23,300	27,550	31,900	35,200	37,150
ELEVATOR-STRUCTURE	26,750	31,000	39,350	------	------	------	------
ANDERSON							
DETACHED AND SEMIDETACHED	15,250	18,500	22,700	27,200	32,750	36,300	38,250
ROW DWELLINGS	15,300	18,300	22,650	26,950	32,450	36,000	37,550
WALKUP	13,750	16,950	21,700	25,750	29,600	32,750	34,500
ELEVATOR-STRUCTURE	26,600	30,850	38,650	------	------	------	------
BEAUFORT							
DETACHED AND SEMIDETACHED	15,700	19,150	23,500	28,150	33,850	37,550	39,500
ROW DWELLINGS	15,800	19,250	23,400	27,800	33,400	37,200	39,050
WALKUP	14,600	18,150	22,900	27,000	31,450	34,600	36,300
ELEVATOR-STRUCTURE	27,050	31,250	39,500	------	------	------	------
CHARLESTON							
DETACHED AND SEMIDETACHED	16,950	20,550	25,300	30,400	36,500	40,450	42,550
ROW DWELLINGS	16,950	20,450	25,400	30,200	36,250	40,250	42,100
WALKUP	15,250	19,200	24,200	28,600	33,150	36,400	38,300
ELEVATOR-STRUCTURE	27,650	32,000	40,500	------	------	------	------
FLORENCE							
DETACHED AND SEMIDETACHED	14,750	17,950	22,000	26,500	31,800	35,450	37,050
ROW DWELLINGS	14,750	17,700	21,900	26,150	31,550	34,900	36,600
WALKUP	13,600	17,050	21,600	25,400	29,450	32,500	34,400
ELEVATOR-STRUCTURE	26,750	31,000	39,350	------	------	------	------
GREENVILLE							
DETACHED AND SEMIDETACHED	15,500	18,800	23,200	27,550	33,300	37,000	38,750
ROW DWELLINGS	15,550	18,650	22,950	27,350	32,950	36,600	38,300
WALKUP	13,800	17,350	21,800	25,800	29,900	33,100	34,700
ELEVATOR-STRUCTURE	26,750	31,000	39,350	------	------	------	------
GREENWOOD							
DETACHED AND SEMIDETACHED	15,500	18,800	23,300	27,700	33,250	37,000	38,800
ROW DWELLINGS	15,550	18,650	23,050	27,350	32,950	36,750	38,300
WALKUP	14,250	17,700	22,650	26,700	30,750	34,250	36,050
ELEVATOR-STRUCTURE	26,600	30,850	38,650	------	------	------	------
MYRTLE BEACH							
DETACHED AND SEMIDETACHED	15,700	19,150	23,500	28,150	33,850	37,550	39,500
ROW DWELLINGS	15,800	19,250	23,400	27,800	33,400	37,200	39,050
WALKUP	14,600	18,150	22,900	27,000	31,450	34,600	36,300
ELEVATOR-STRUCTURE	27,050	31,250	39,500	------	------	------	------
NORTH AUGUSTA							
DETACHED AND SEMIDETACHED	16,450	19,850	24,400	29,250	35,050	38,850	40,850
ROW DWELLINGS	16,200	19,650	24,250	28,650	34,850	38,500	40,250
WALKUP	15,000	18,700	23,800	27,850	32,350	35,850	37,700
ELEVATOR-STRUCTURE	27,900	32,400	40,900	------	------	------	------
ORANGEBURG							
DETACHED AND SEMIDETACHED	15,450	18,700	23,000	27,500	33,100	36,700	38,500
ROW DWELLINGS	15,500	18,550	22,850	27,100	32,800	36,400	38,100
WALKUP	14,200	17,650	22,450	26,950	30,650	33,650	35,600
ELEVATOR-STRUCTURE	26,300	30,600	38,500	------	------	------	------
ROCKHILL							
DETACHED AND SEMIDETACHED	15,550	18,950	23,300	28,050	33,500	37,350	39,150
ROW DWELLINGS	15,700	18,900	23,150	27,500	33,200	36,950	38,600
WALKUP	14,500	18,150	22,800	26,950	31,200	34,400	36,250
ELEVATOR-STRUCTURE	26,750	31,000	39,350	------	------	------	------
SPARTANSBURG							
DETACHED AND SEMIDETACHED	15,950	19,250	23,550	28,300	34,100	37,750	39,550
ROW DWELLINGS	15,800	19,050	23,500	27,950	33,750	37,500	39,100
WALKUP	14,600	18,250	22,950	27,100	31,550	34,700	36,400
ELEVATOR-STRUCTURE	26,750	31,000	39,350	------	------	------	------
TENNESSEE							
KNOXVILLE							
DETACHED AND SEMIDETACHED	16,400	19,700	24,250	29,100	35,150	38,850	40,750
ROW DWELLINGS	15,650	18,800	23,300	27,700	33,350	36,900	38,750
WALKUP	14,900	18,600	23,600	27,950	32,450	35,750	37,550
ELEVATOR-STRUCTURE	24,400	28,350	35,750	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION IV--CONTINUED							
TENNESSEE --CONTINUED							
CHATTANOOGA :							
DETACHED AND SEMIDETACHED	15,900	19,100	23,500	28,200	34,000	37,400	39,300
ROW DWELLINGS	16,550	19,800	24,650	29,300	35,150	39,200	41,050
WALKUP	16,050	20,100	25,500	30,150	35,000	38,550	40,500
ELEVATOR-STRUCTURE	26,200	30,500	38,300	------	------	------	------
JOHNSON CITY :							
DETACHED AND SEMIDETACHED	15,550	18,750	23,050	27,450	33,250	36,850	38,550
ROW DWELLINGS	14,900	17,800	22,050	26,350	31,600	35,000	36,800
WALKUP	14,900	18,600	23,600	27,950	32,350	35,650	37,550
ELEVATOR-STRUCTURE	24,400	28,350	35,750	------	------	------	------
KINGSPORT :							
DETACHED AND SEMIDETACHED	16,100	19,500	23,850	28,550	34,550	38,100	40,100
ROW DWELLINGS	15,450	18,550	22,900	27,200	32,750	36,300	38,100
WALKUP	14,150	17,550	22,100	26,300	30,450	33,600	35,150
ELEVATOR-STRUCTURE	24,400	28,350	35,750	------	------	------	------
OAK RIDGE :							
DETACHED AND SEMIDETACHED	15,900	19,100	23,550	28,200	33,950	37,750	39,450
ROW DWELLINGS	15,200	18,350	22,600	26,950	32,450	35,900	37,800
WALKUP	14,850	18,600	23,550	27,900	32,400	35,650	37,400
ELEVATOR-STRUCTURE	24,400	28,350	35,750	------	------	------	------
MEMPHIS :							
DETACHED AND SEMIDETACHED	17,100	20,750	25,550	30,500	36,750	40,950	42,750
ROW DWELLINGS	16,200	19,700	24,450	29,000	34,800	38,750	40,600
WALKUP	15,800	19,550	25,050	29,500	34,150	37,550	39,450
ELEVATOR-STRUCTURE	25,550	29,600	37,300	------	------	------	------
JACKSON :							
DETACHED AND SEMIDETACHED	18,500	22,350	27,550	32,900	39,750	44,150	46,050
ROW DWELLINGS	17,500	21,400	26,350	31,250	37,550	41,900	44,000
WALKUP	17,600	21,650	27,900	32,850	37,900	41,750	43,950
ELEVATOR-STRUCTURE	25,550	29,600	37,300	------	------	------	------
UNION CITY :							
DETACHED AND SEMIDETACHED	18,550	22,500	27,700	33,100	40,050	44,400	46,500
ROW DWELLINGS	17,600	21,400	26,450	31,450	37,950	42,250	44,300
WALKUP	15,500	19,100	24,500	28,950	33,500	36,850	38,750
ELEVATOR-STRUCTURE	27,900	32,350	40,750	------	------	------	------
NASHVILLE :							
DETACHED AND SEMIDETACHED	16,450	19,750	24,350	29,100	35,050	39,100	40,750
ROW DWELLINGS	15,750	19,200	23,450	28,000	33,750	37,550	39,400
WALKUP	15,000	18,750	23,800	28,100	32,700	35,950	37,800
ELEVATOR-STRUCTURE	23,700	27,700	35,050	------	------	------	------
CLARKSVILLE :							
DETACHED AND SEMIDETACHED	15,750	19,150	23,500	28,050	33,900	37,700	39,450
ROW DWELLINGS	15,350	18,400	22,650	27,100	32,500	36,150	37,950
WALKUP	13,800	17,250	22,050	25,850	30,050	33,100	34,700
ELEVATOR-STRUCTURE	24,800	28,900	36,650	------	------	------	------
COLUMBIA :							
DETACHED AND SEMIDETACHED	16,500	19,800	24,500	29,200	35,100	39,150	40,900
ROW DWELLINGS	15,800	19,250	23,500	28,100	33,800	37,600	39,450
WALKUP	15,150	18,850	24,200	28,200	33,000	36,250	38,150
ELEVATOR-STRUCTURE	25,550	30,050	38,050	------	------	------	------
REGION V							
ILLINOIS							
CHICAGO :							
DETACHED AND SEMIDETACHED	26,900	32,850	40,200	47,900	57,600	64,250	67,200
ROW DWELLINGS	25,500	30,950	37,900	45,300	54,550	60,600	63,550
WALKUP	24,150	29,950	37,800	44,900	48,500	57,200	60,100
ELEVATOR-STRUCTURE	31,200	36,400	46,000	------	------	------	------
MOLINE :							
DETACHED AND SEMIDETACHED	21,200	25,750	31,800	37,800	45,650	50,700	53,050
ROW DWELLINGS	19,550	23,650	29,150	34,700	41,850	46,450	48,750
WALKUP	19,450	24,250	30,650	36,450	39,100	46,250	48,400
ELEVATOR-STRUCTURE	31,200	36,350	46,000	------	------	------	------
SPRINGFIELD :							
DETACHED AND SEMIDETACHED	21,750	26,400	32,450	38,850	46,700	51,850	54,350
ROW DWELLINGS	21,000	25,500	31,300	37,550	45,100	50,050	52,450
WALKUP	19,700	23,950	29,350	35,100	42,200	46,850	49,150
ELEVATOR-STRUCTURE	26,400	30,600	38,650	------	------	------	------
BELLEVILLE :							
DETACHED AND SEMIDETACHED	22,100	26,600	33,050	39,350	47,300	52,600	55,200
ROW DWELLINGS	20,600	24,650	30,550	36,300	43,550	48,750	50,850
WALKUP	19,600	24,400	31,050	36,600	42,450	46,950	49,300
ELEVATOR-STRUCTURE	27,950	32,400	40,950	------	------	------	------
EAST ST LOUIS :							
DETACHED AND SEMIDETACHED	22,000	26,550	33,050	39,400	47,200	52,550	55,000
ROW DWELLINGS	20,450	24,550	30,550	36,200	43,500	48,700	50,800
WALKUP	19,650	24,350	31,050	36,600	42,200	46,700	49,000
ELEVATOR-STRUCTURE	27,900	32,350	40,950	------	------	------	------
INDIANA							
INDIANAPOLIS :							
DETACHED AND SEMIDETACHED	18,700	22,600	27,750	33,200	39,850	44,350	46,350
ROW DWELLINGS	16,250	19,600	27,000	28,950	34,650	38,700	40,350
WALKUP	17,000	21,350	26,850	31,800	36,750	40,600	42,550
ELEVATOR-STRUCTURE	28,250	32,950	41,650	------	------	------	------
BLOOMINGTON :							
DETACHED AND SEMIDETACHED	18,400	22,150	27,350	32,700	39,200	43,600	45,700
ROW DWELLINGS	16,600	20,000	24,700	29,300	35,300	39,250	41,050
WALKUP	17,550	22,000	27,700	32,800	38,100	42,050	43,950
ELEVATOR-STRUCTURE	28,850	33,350	42,450	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
	REGION V--CONTINUED						
INDIANA --CONTINUED							
EVANSVILLE :							
DETACHED AND SEMIDETACHED	17,800	21,500	26,500	31,750	38,000	40,650	44,350
ROW DWELLINGS	17,950	21,450	26,500	31,500	37,950	42,350	44,200
WALKUP	17,850	22,400	28,300	33,450	38,750	42,650	44,750
ELEVATOR-STRUCTURE	27,850	32,500	41,200	------	------	------	------
FORT WAYNE :							
DETACHED AND SEMIDETACHED	18,100	21,850	26,950	32,050	38,550	43,250	44,850
ROW DWELLINGS	15,800	19,100	23,400	27,950	33,550	37,500	39,200
WALKUP	16,800	21,050	26,750	31,400	36,400	40,150	42,200
ELEVATOR-STRUCTURE	28,200	32,650	41,500	------	------	------	------
GARY :							
DETACHED AND SEMIDETACHED	18,900	22,900	28,250	33,650	40,400	44,800	47,000
ROW DWELLINGS	19,950	24,150	29,850	35,450	42,600	47,700	49,600
WALKUP	21,600	26,750	33,700	39,850	43,300	50,750	53,200
ELEVATOR-STRUCTURE	28,200	32,750	41,500	------	------	------	------
HAMMOND :							
DETACHED AND SEMIDETACHED	19,850	24,200	29,750	35,400	42,500	47,350	49,500
ROW DWELLINGS	23,700	28,700	35,350	41,950	50,450	56,400	58,800
WALKUP	18,500	23,250	29,200	34,550	40,000	44,000	46,300
ELEVATOR-STRUCTURE	28,800	33,350	42,250	------	------	------	------
LAFAYETTE :							
DETACHED AND SEMIDETACHED	19,150	23,200	28,500	34,000	40,650	45,450	47,600
ROW DWELLINGS	16,600	20,000	24,750	29,500	35,450	39,500	41,250
WALKUP	17,400	21,750	27,650	32,600	37,700	41,600	43,600
ELEVATOR-STRUCTURE	29,100	33,750	42,650	------	------	------	------
SOUTH BEND :							
DETACHED AND SEMIDETACHED	19,250	23,300	28,650	34,250	41,100	45,800	47,900
ROW DWELLINGS	18,250	22,100	27,150	32,250	38,750	43,350	45,250
WALKUP	17,850	22,300	28,100	33,250	38,400	42,250	44,400
ELEVATOR-STRUCTURE	29,300	34,100	43,100	------	------	------	------
TERRE HAUTE :							
DETACHED AND SEMIDETACHED	19,800	23,950	29,600	35,200	42,200	47,000	49,150
ROW DWELLINGS	20,900	25,050	31,000	36,950	44,200	49,400	51,700
WALKUP	19,200	23,700	30,100	35,750	41,300	45,400	47,750
ELEVATOR-STRUCTURE	29,700	34,500	43,850	------	------	------	------
MICHIGAN							
DETROIT :							
DETACHED AND SEMIDETACHED	24,050	25,450	31,200	37,300	44,800	50,000	52,200
ROW DWELLINGS	17,800	21,450	26,500	31,550	38,050	42,300	44,250
WALKUP	18,300	22,600	28,750	33,950	39,250	43,350	45,550
ELEVATOR-STRUCTURE	28,900	33,650	42,650	------	------	------	------
ANN ARBOR :							
DETACHED AND SEMIDETACHED	25,900	27,350	33,500	40,100	48,300	53,700	56,100
ROW DWELLINGS	19,100	23,100	28,500	33,900	40,950	45,450	47,650
WALKUP	19,050	23,500	29,800	35,300	40,700	45,100	47,200
ELEVATOR-STRUCTURE	28,900	33,650	42,650	------	------	------	------
FLINT :							
DETACHED AND SEMIDETACHED	26,850	28,400	34,950	41,750	50,150	55,850	58,750
ROW DWELLINGS	20,000	24,100	29,700	35,350	42,400	47,250	49,650
WALKUP	17,900	22,250	28,050	33,300	38,600	42,550	44,550
ELEVATOR-STRUCTURE	27,750	32,350	41,000	------	------	------	------
SAGINAW :							
DETACHED AND SEMIDETACHED	24,850	26,300	32,250	38,350	46,200	51,500	53,950
ROW DWELLINGS	18,400	22,250	27,300	32,650	39,200	43,600	45,750
WALKUP	18,050	22,550	28,450	33,850	39,250	43,100	45,250
ELEVATOR-STRUCTURE	27,750	32,350	41,000	------	------	------	------
YPSILANTI :							
DETACHED AND SEMIDETACHED	27,350	28,900	35,500	42,150	50,800	56,600	59,300
ROW DWELLINGS	20,400	24,300	30,150	35,850	43,250	47,950	50,350
WALKUP	18,300	22,700	28,600	33,950	39,250	43,350	45,600
ELEVATOR-STRUCTURE	28,550	33,400	42,200	------	------	------	------
GRAND RAPIDS :							
DETACHED AND SEMIDETACHED	22,050	26,750	32,900	39,200	47,150	52,750	55,000
ROW DWELLINGS	18,200	22,000	27,250	32,300	38,750	43,250	45,200
WALKUP	17,600	22,200	28,000	33,000	38,400	42,350	44,300
ELEVATOR-STRUCTURE	27,400	31,950	40,300	------	------	------	------
MT PLEASANT :							
DETACHED AND SEMIDETACHED	23,050	27,900	34,300	40,850	49,250	55,000	57,400
ROW DWELLINGS	19,050	22,900	28,400	33,650	40,350	45,100	47,200
WALKUP	18,350	23,100	29,250	34,450	40,000	44,150	46,200
ELEVATOR-STRUCTURE	28,600	33,350	41,950	------	------	------	------
BATTLE CREEK :							
DETACHED AND SEMIDETACHED	22,700	27,400	33,650	40,200	48,400	53,900	56,300
ROW DWELLINGS	18,650	22,450	27,750	33,100	39,850	44,400	46,400
WALKUP	17,600	21,850	27,850	32,900	38,050	42,100	44,100
ELEVATOR-STRUCTURE	28,150	32,700	41,150	------	------	------	------
BENTON HARBOR :							
DETACHED AND SEMIDETACHED	24,450	29,550	36,300	43,300	52,050	58,250	60,700
ROW DWELLINGS	20,200	24,300	30,000	35,700	42,850	45,650	49,900
WALKUP	18,800	23,400	29,600	35,150	40,450	44,800	47,050
ELEVATOR-STRUCTURE	29,450	34,350	43,300	------	-----	------	------
JACKSON :							
DETACHED AND SEMIDETACHED	23,500	28,600	35,250	41,800	50,600	56,300	58,850
ROW DWELLINGS	19,550	23,350	28,950	34,500	41,550	46,250	48,400
WALKUP	18,850	23,750	29,950	35,500	40,800	45,350	47,400
ELEVATOR-STRUCTURE	29,300	34,050	43,000	------	------	------	------
LANSING :							
DETACHED AND SEMIDETACHED	26,250	31,700	39,100	46,550	55,950	62,500	65,450
ROW DWELLINGS	21,700	30,650	32,300	38,400	46,150	51,200	53,800
WALKUP	18,350	22,900	29,000	34,350	39,800	44,000	46,100
ELEVATOR-STRUCTURE	28,500	33,450	42,150	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION V--CONTINUED							
MICHIGAN --CONTINUED							
MARQUETTE :							
DETACHED AND SEMIDETACHED	24,350	29,550	36,250	43,200	52,100	58,150	60,750
ROW DWELLINGS	20,100	24,300	29,900	35,650	42,950	47,900	50,050
WALKUP	20,400	24,600	30,250	35,950	43,450	48,450	50,650
ELEVATOR-STRUCTURE	29,650	34,700	43,600	------	------	------	------
MUSKEGON :							
DETACHED AND SEMIDETACHED	22,250	26,850	33,250	39,550	47,600	53,250	55,450
ROW DWELLINGS	18,450	22,150	27,400	32,500	38,950	43,550	45,750
WALKUP	15,650	19,550	24,700	29,300	33,750	37,300	39,100
ELEVATOR-STRUCTURE	27,400	31,950	40,300	------	------	------	------
TRAVERSE CITY :							
DETACHED AND SEMIDETACHED	24,350	29,450	36,300	43,300	51,950	58,150	60,600
ROW DWELLINGS	20,200	24,300	30,000	35,600	42,850	47,800	50,050
WALKUP	17,150	21,350	27,050	32,100	37,050	41,150	42,800
ELEVATOR-STRUCTURE	30,100	35,100	44,150	------	------	------	------
MINNESOTA							
MINNEAPOLIS :							
DETACHED AND SEMIDETACHED	24,300	29,400	36,350	43,450	52,100	58,000	60,650
ROW DWELLINGS	20,850	25,400	31,150	37,200	44,650	49,650	52,000
WALKUP	20,850	26,150	32,850	38,750	44,750	49,600	51,900
ELEVATOR-STRUCTURE	28,500	32,950	41,900	------	------	------	------
DULUTH :							
DETACHED AND SEMIDETACHED	24,700	29,900	36,700	44,000	52,850	58,950	61,600
ROW DWELLINGS	21,300	25,700	31,700	37,750	45,300	50,550	52,850
WALKUP	22,100	27,350	34,850	41,000	47,400	52,450	54,950
ELEVATOR-STRUCTURE	28,950	33,600	42,400	------	------	------	------
MANKATO :							
DETACHED AND SEMIDETACHED	23,050	28,250	34,650	41,350	49,850	55,400	58,000
ROW DWELLINGS	20,050	24,100	29,800	35,550	42,850	47,600	49,650
WALKUP	22,100	27,150	34,700	41,000	47,250	52,100	54,950
ELEVATOR-STRUCTURE	27,200	31,550	39,850	------	------	------	------
ROCHESTER :							
DETACHED AND SEMIDETACHED	23,750	28,800	35,550	42,350	51,050	56,650	59,300
ROW DWELLINGS	20,550	24,650	30,500	36,400	43,650	48,450	50,850
WALKUP	20,350	25,250	31,900	37,800	43,750	48,300	50,700
ELEVATOR-STRUCTURE	26,550	30,950	39,300	------	------	------	------
ST CLOUD :							
DETACHED AND SEMIDETACHED	23,050	27,900	34,650	41,250	49,400	55,000	57,600
ROW DWELLINGS	20,000	24,150	29,800	35,550	42,550	47,600	49,600
WALKUP	20,850	25,950	33,100	39,050	45,150	49,800	52,200
ELEVATOR-STRUCTURE	26,300	30,500	38,550	------	------	------	------
WORTHINGTON :							
DETACHED AND SEMIDETACHED	22,100	26,800	33,050	39,450	47,200	52,750	55,100
ROW DWELLINGS	19,200	22,950	28,400	33,750	40,650	45,150	47,350
WALKUP	19,100	23,800	30,200	35,600	41,100	45,300	47,700
ELEVATOR-STRUCTURE	26,050	30,350	38,450	------	------	------	------
OHIO							
CINCINNATI :							
DETACHED AND SEMIDETACHED	21,700	26,250	32,400	38,750	46,350	51,750	54,200
ROW DWELLINGS	20,700	25,100	30,900	36,650	43,900	49,000	51,500
WALKUP	21,400	26,400	33,650	39,900	46,000	50,650	53,250
ELEVATOR-STRUCTURE	32,550	37,800	47,750	------	------	------	------
DAYTON :							
DETACHED AND SEMIDETACHED	21,700	26,250	32,400	38,750	46,350	51,750	54,200
ROW DWELLINGS	21,100	25,650	31,650	37,600	45,100	50,250	52,700
WALKUP	21,400	26,400	33,650	39,900	46,000	50,650	53,250
ELEVATOR-STRUCTURE	32,550	37,800	47,750	------	------	------	------
CLEVELAND :							
DETACHED AND SEMIDETACHED	21,000	25,750	31,450	37,650	45,200	50,300	52,750
ROW DWELLINGS	20,650	24,800	30,750	36,750	44,050	49,300	51,350
WALKUP	20,050	24,750	31,350	37,250	43,050	47,550	50,000
ELEVATOR-STRUCTURE	27,050	31,600	39,950	------	------	------	------
AKRON :							
DETACHED AND SEMIDETACHED	20,800	25,250	31,000	37,100	44,550	49,550	52,000
ROW DWELLINGS	20,400	24,450	30,350	36,300	43,250	48,550	50,700
WALKUP	19,850	24,400	30,850	36,750	42,500	46,850	49,300
ELEVATOR-STRUCTURE	26,650	31,250	39,450	------	------	------	------
FINDLAY :							
DETACHED AND SEMIDETACHED	19,250	23,450	28,700	34,250	41,150	45,850	47,900
ROW DWELLINGS	18,800	22,700	28,050	33,400	40,100	44,750	46,750
WALKUP	18,250	22,500	28,500	33,950	39,200	43,250	45,450
ELEVATOR-STRUCTURE	24,700	28,750	36,350	------	------	------	------
LORAIN :							
DETACHED AND SEMIDETACHED	20,900	25,500	31,200	37,350	44,750	49,950	52,250
ROW DWELLINGS	20,550	24,500	30,450	36,400	43,500	48,750	50,950
WALKUP	19,950	24,550	31,000	36,850	42,650	47,050	49,400
ELEVATOR-STRUCTURE	26,750	31,350	39,600	------	------	------	------
MANSFIELD :							
DETACHED AND SEMIDETACHED	19,600	23,950	29,300	35,000	42,050	46,850	49,050
ROW DWELLINGS	19,200	23,100	28,550	34,150	40,950	45,800	47,700
WALKUP	18,700	23,100	29,100	34,700	40,100	44,200	46,450
ELEVATOR-STRUCTURE	25,100	29,350	37,150	------	------	------	------
TOLEDO :							
DETACHED AND SEMIDETACHED	21,000	25,750	31,450	37,650	45,200	50,300	52,750
ROW DWELLINGS	20,650	24,800	30,750	36,750	44,050	49,300	51,350
WALKUP	20,050	24,750	31,350	37,250	43,050	47,550	50,000
ELEVATOR-STRUCTURE	27,050	31,600	39,950	------	------	------	------
YOUNGSTOWN :							
DETACHED AND SEMIDETACHED	20,300	24,850	30,150	36,150	43,400	48,350	50,700
ROW DWELLINGS	19,900	23,900	29,600	35,250	42,250	47,250	49,350
WALKUP	19,200	23,800	30,050	35,850	41,400	45,700	48,000
ELEVATOR-STRUCTURE	26,000	30,400	38,300	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION V--CONTINUED							
OHIO --CONTINUED							
COLUMBUS :							
DETACHED AND SEMIDETACHED	21,050	25,350	31,400	37,450	45,000	50,150	52,500
ROW DWELLINGS	18,600	22,450	27,750	32,900	39,550	44,200	46,200
WALKUP	20,150	24,950	31,500	37,500	43,200	47,650	50,200
ELEVATOR-STRUCTURE	28,250	32,800	41,550	------	------	------	------
ATHENS :							
DETACHED AND SEMIDETACHED	21,300	25,800	31,900	37,750	45,700	51,150	53,100
ROW DWELLINGS	18,300	21,900	27,050	32,300	38,750	43,200	45,200
WALKUP	19,450	24,250	30,800	36,450	42,150	46,400	49,000
ELEVATOR-STRUCTURE	28,550	33,300	42,150	------	------	------	------
LIMA :							
DETACHED AND SEMIDETACHED	21,050	25,350	31,400	37,450	45,000	50,150	52,500
ROW DWELLINGS	18,200	21,900	27,050	32,250	38,750	43,150	45,200
WALKUP	19,500	24,300	30,800	36,500	42,200	46,450	48,900
ELEVATOR-STRUCTURE	28,250	32,800	41,550	------	------	------	------
NEWARK :							
DETACHED AND SEMIDETACHED	20,550	24,850	30,650	36,500	43,900	49,100	51,150
ROW DWELLINGS	18,200	21,900	27,000	32,150	38,650	43,050	45,100
WALKUP	19,450	24,250	30,750	36,450	42,100	46,400	48,600
ELEVATOR-STRUCTURE	27,550	32,050	40,500	------	------	------	------
SPRINGFIELD :							
DETACHED AND SEMIDETACHED	21,050	25,350	31,400	37,450	45,000	50,150	52,500
ROW DWELLINGS	18,400	22,350	27,450	32,800	39,350	43,700	45,800
WALKUP	19,950	24,700	31,200	37,150	42,650	47,200	49,600
ELEVATOR-STRUCTURE	28,250	32,800	41,550	------	------	------	------
SIDNEY :							
DETACHED AND SEMIDETACHED	21,250	26,050	32,000	38,150	45,750	51,350	53,450
ROW DWELLINGS	18,350	22,200	27,250	32,600	38,950	43,450	45,450
WALKUP	19,550	24,550	31,050	37,050	42,500	47,000	49,250
ELEVATOR-STRUCTURE	28,800	33,450	42,250	------	------	------	------
ZANESVILLE :							
DETACHED AND SEMIDETACHED	21,300	25,800	31,900	37,750	45,700	51,150	53,100
ROW DWELLINGS	18,900	22,750	28,100	33,450	40,150	44,950	47,000
WALKUP	20,100	24,900	31,400	37,450	43,200	47,550	50,150
ELEVATOR-STRUCTURE	28,550	33,300	42,150	------	------	------	------
WISCONSIN							
MILWAUKEE :							
DETACHED AND SEMIDETACHED	24,800	30,150	37,150	44,300	53,250	59,350	62,200
ROW DWELLINGS	23,350	28,050	34,350	41,050	49,400	54,850	57,550
WALKUP	19,600	24,200	30,800	36,250	42,100	46,450	48,650
ELEVATOR-STRUCTURE	26,350	30,500	38,500	------	------	------	------
EAU CLAIRE :							
DETACHED AND SEMIDETACHED	24,100	29,100	35,850	42,950	51,550	57,550	60,050
ROW DWELLINGS	22,600	26,950	33,300	39,600	47,600	52,950	55,500
WALKUP	19,700	24,450	31,050	36,600	42,500	46,600	49,000
ELEVATOR-STRUCTURE	25,600	29,750	37,550	------	------	------	------
GREEN BAY :							
DETACHED AND SEMIDETACHED	23,050	27,800	34,250	41,050	49,100	54,950	57,550
ROW DWELLINGS	20,950	25,000	30,800	36,950	44,200	49,300	51,550
WALKUP	18,250	22,700	28,550	33,800	39,200	43,300	45,250
ELEVATOR-STRUCTURE	24,400	28,400	36,000	------	------	------	------
MADISON :							
DETACHED AND SEMIDETACHED	24,400	29,700	36,500	43,550	52,500	58,450	61,100
ROW DWELLINGS	22,350	26,600	32,850	39,150	47,050	52,650	54,850
WALKUP	19,400	23,950	30,450	36,000	41,750	46,050	48,100
ELEVATOR-STRUCTURE	26,050	30,300	38,250	------	------	------	------
REEDSVILLE :							
DETACHED AND SEMIDETACHED	23,500	28,450	34,950	41,950	50,150	56,150	58,800
ROW DWELLINGS	21,300	25,850	31,600	37,800	45,350	50,450	52,950
WALKUP	18,750	23,300	29,200	34,700	40,250	44,250	46,450
ELEVATOR-STRUCTURE	25,100	29,100	36,800	------	------	------	------
SUPERIOR :							
DETACHED AND SEMIDETACHED	25,100	30,250	37,350	44,650	53,600	59,900	62,550
ROW DWELLINGS	23,400	28,050	34,550	41,300	49,800	55,150	57,900
WALKUP	20,400	25,200	31,850	37,750	43,650	48,200	50,550
ELEVATOR-STRUCTURE	26,600	30,950	39,150	------	------	------	------
WAUSAU :							
DETACHED AND SEMIDETACHED	23,500	28,450	34,950	41,950	50,150	56,150	58,800
ROW DWELLINGS	21,250	25,750	31,350	37,700	45,050	50,350	52,800
WALKUP	18,750	23,200	29,100	34,550	39,850	44,050	46,200
ELEVATOR-STRUCTURE	24,950	28,950	36,750	------	------	------	------
REGION VI							
ARKANSAS							
LITTLE ROCK :							
DETACHED AND SEMIDETACHED	17,450	21,150	26,150	31,150	37,400	41,700	43,350
ROW DWELLINGS	15,700	18,950	23,300	27,800	33,450	37,150	39,000
WALKUP	16,600	20,700	26,150	31,050	36,000	39,800	41,600
ELEVATOR-STRUCTURE	29,350	33,950	43,250	------	------	------	------
FAYETTEVILLE :							
DETACHED AND SEMIDETACHED	17,400	20,900	25,950	30,800	37,250	41,250	43,150
ROW DWELLINGS	15,550	18,900	23,200	27,650	33,300	36,900	38,600
WALKUP	14,950	18,750	23,650	27,950	32,550	35,750	37,400
ELEVATOR-STRUCTURE	29,150	33,700	42,450	------	------	------	------
FORT SMITH :							
DETACHED AND SEMIDETACHED	16,350	19,900	24,600	29,100	35,050	39,000	40,700
ROW DWELLINGS	14,900	18,050	22,350	26,550	31,900	35,500	37,150
WALKUP	15,800	19,550	24,750	29,250	33,850	37,400	39,150
ELEVATOR-STRUCTURE	29,600	34,450	43,550	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VI--CONTINUED							
ARKANSAS --CONTINUED							
JONESBORO							
DETACHED AND SEMIDETACHED	16,250	19,550	24,350	28,800	34,700	38,600	40,100
ROW DWELLINGS	14,700	17,700	22,150	26,050	31,400	35,250	36,550
WALKUP	15,450	19,200	24,300	28,750	33,200	36,750	38,550
ELEVATOR-STRUCTURE	28,650	33,200	42,150	------	------	------	------
TEXARKANA							
DETACHED AND SEMIDETACHED	16,800	20,250	25,050	29,850	35,900	39,800	41,550
ROW DWELLINGS	14,900	18,150	22,350	26,600	32,100	35,650	37,250
WALKUP	15,850	19,800	24,950	29,600	34,300	37,750	39,600
ELEVATOR-STRUCTURE	29,150	33,700	42,450	------	------	------	------
LOUISIANA							
NEW ORLEANS							
DETACHED AND SEMIDETACHED	17,300	21,000	25,700	30,550	37,050	41,200	42,800
ROW DWELLINGS	16,300	19,800	24,700	29,300	35,150	39,050	41,100
WALKUP	15,900	19,800	24,850	29,250	33,950	37,550	39,050
ELEVATOR-STRUCTURE	29,200	33,800	43,050	------	------	------	------
BATON ROUGE							
DETACHED AND SEMIDETACHED	18,600	22,350	27,650	32,700	39,400	44,050	45,750
ROW DWELLINGS	17,550	21,200	26,450	31,350	37,500	41,600	43,750
WALKUP	15,150	18,950	23,850	28,200	32,500	36,050	37,600
ELEVATOR-STRUCTURE	28,900	33,450	42,600	------	------	------	------
HOUMA							
DETACHED AND SEMIDETACHED	17,250	20,750	25,550	30,350	36,700	40,700	42,400
ROW DWELLINGS	16,250	19,700	24,450	29,050	34,850	38,750	40,700
WALKUP	15,550	19,500	24,250	28,800	33,400	36,950	38,550
ELEVATOR-STRUCTURE	28,900	33,450	42,600	------	------	------	------
LAFAYETTE							
DETACHED AND SEMIDETACHED	17,250	20,750	25,550	30,350	36,700	40,700	42,400
ROW DWELLINGS	16,250	19,700	24,450	29,050	34,850	38,750	40,700
WALKUP	15,750	19,750	24,450	29,050	33,750	37,150	38,900
ELEVATOR-STRUCTURE	28,900	33,450	42,600	------	------	------	------
LAKE CHARLES							
DETACHED AND SEMIDETACHED	18,550	22,350	27,550	32,700	39,400	43,850	45,750
ROW DWELLINGS	17,500	21,150	26,450	31,350	37,500	41,600	43,750
WALKUP	16,000	20,050	25,200	29,800	34,500	38,250	39,900
ELEVATOR-STRUCTURE	29,200	33,800	43,050	------	------	------	------
SHREVEPORT							
DETACHED AND SEMIDETACHED	18,000	21,500	26,750	31,650	38,300	42,750	44,500
ROW DWELLINGS	16,500	20,200	24,950	29,700	35,850	39,750	41,500
WALKUP	14,500	18,050	22,950	27,150	31,350	34,750	36,450
ELEVATOR-STRUCTURE	29,250	34,000	43,050	------	------	------	------
ALEXANDRIA							
DETACHED AND SEMIDETACHED	16,350	19,500	24,250	28,900	34,600	38,700	40,450
ROW DWELLINGS	15,950	18,400	22,750	27,100	32,450	36,250	37,900
WALKUP	14,100	17,500	22,250	26,300	30,450	33,550	35,350
ELEVATOR-STRUCTURE	28,400	33,000	41,600	------	------	------	------
MARSHALL							
DETACHED AND SEMIDETACHED	16,400	19,550	24,350	29,000	34,800	38,850	40,500
ROW DWELLINGS	15,400	18,750	23,100	27,550	33,100	36,900	38,500
WALKUP	14,050	17,450	22,150	26,050	30,300	33,500	34,900
ELEVATOR-STRUCTURE	27,100	31,500	39,950	------	------	------	------
MONROE							
DETACHED AND SEMIDETACHED	16,200	19,400	23,950	28,550	34,400	38,450	39,950
ROW DWELLINGS	15,150	18,350	22,600	27,000	32,400	36,100	37,650
WALKUP	14,500	17,950	22,750	26,950	31,200	34,350	36,150
ELEVATOR-STRUCTURE	29,000	33,550	42,800	------	------	------	------
NEW MEXICO							
ALBUQUERQUE							
DETACHED AND SEMIDETACHED	18,350	22,000	24,550	29,200	35,100	39,300	40,950
ROW DWELLINGS	17,000	20,300	22,600	27,050	32,300	36,000	37,850
WALKUP	14,700	18,200	20,650	24,400	28,400	31,100	32,700
ELEVATOR-STRUCTURE	25,750	30,050	38,050	------	------	------	------
ALAMOGORDO							
DETACHED AND SEMIDETACHED	19,300	22,950	25,700	30 550	36,800	41,100	42,850
ROW DWELLINGS	17,650	21,150	23,550	28,100	33,550	37,350	39,250
WALKUP	15,250	18,950	21,400	25,300	29,350	32,350	34,000
ELEVATOR-STRUCTURE	24,250	28,200	35,550	------	------	------	------
ARTESIA							
DETACHED AND SEMIDETACHED	19,300	22,950	25,600	30,500	36,800	41,050	42,500
ROW DWELLINGS	17,650	21,150	23,600	28,300	33,700	37,500	39,350
WALKUP	15,350	19,000	21,400	25,700	29,550	32,650	34,100
ELEVATOR-STRUCTURE	24,600	28,600	36,200	------	------	------	------
CARLSBAD							
DETACHED AND SEMIDETACHED	19,500	23,450	26,100	31,100	37,400	41,700	43,350
ROW DWELLINGS	17,900	21,600	24,050	28,800	34,250	38,200	40,100
WALKUP	15,200	19,000	21,400	25,300	29,350	32,400	33,950
ELEVATOR-STRUCTURE	24,600	28,600	36,200	------	------	------	------
CLOVIS							
DETACHED AND SEMIDETACHED	19,300	22,950	25,600	30,500	36,800	41,050	42,500
ROW DWELLINGS	17,650	21,150	23,600	28,300	33,700	37,500	39,350
WALKUP	15,200	18,850	21,200	25,300	29,250	32,250	33,750
ELEVATOR-STRUCTURE	24,350	28,250	35,550	------	------	------	------
FORT SUMNER							
DETACHED AND SEMIDETACHED	19,850	24,000	26,750	31,750	38,300	42,800	44,550
ROW DWELLINGS	18,450	22,150	24,600	29,300	35,150	39,050	41,050
WALKUP	16,000	19,800	22,300	26,550	30,700	33,750	35,550
ELEVATOR-STRUCTURE	25,300	29,550	37,250	------	------	------	------
GALLUP							
DETACHED AND SEMIDETACHED	21,000	25,200	28,200	33,450	40,400	45,100	46,900
ROW DWELLINGS	19,050	22,700	25,450	30,200	36,150	40,250	42,200
WALKUP	16,350	20,400	23,050	27,400	31,750	34,900	36,500
ELEVATOR-STRUCTURE	25,900	30,350	38,150	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VI--CONTINUED							
NEW MEXICO --CONTINUED							
HOBBS :							
DETACHED AND SEMIDETACHED	19,300	22,950	25,600	30,500	36,800	41,050	42,500
ROW DWELLINGS	17,650	21,150	23,600	28,300	33,700	37,500	39,350
WALKUP	15,350	19,000	21,400	25,700	29,550	32,650	34,100
ELEVATOR-STRUCTURE	24,350	28,250	35,550	------	------	------	------
LAS CRUCES :							
DETACHED AND SEMIDETACHED	19,300	22,950	25,600	30,500	36,800	41,050	42,500
ROW DWELLINGS	17,650	21,150	23,600	28,300	33,700	37,500	39,350
WALKUP	15,650	19,500	21,800	26,050	30,050	33,150	34,750
ELEVATOR-STRUCTURE	24,350	28,250	35,550	------	------	------	------
LAS VEGAS :							
DETACHED AND SEMIDETACHED	19,700	23,750	26,450	31,400	37,900	42,300	44,050
ROW DWELLINGS	18,600	22,200	24,650	29,550	35,250	39,300	41,100
WALKUP	16,000	19,800	22,400	26,600	30,700	33,950	35,650
ELEVATOR-STRUCTURE	25,300	29,350	37,250	------	------	------	------
LOS ALAMOS :							
DETACHED AND SEMIDETACHED	20,500	24,600	27,400	32,450	39,300	43,900	45,700
ROW DWELLINGS	19,050	22,700	25,450	30,200	36,200	40,250	42,250
WALKUP	16,450	20,400	23,050	27,350	31,550	34,850	36,500
ELEVATOR-STRUCTURE	25,850	30,200	38,100	------	------	------	------
RATON :							
DETACHED AND SEMIDETACHED	19,550	23,500	26,200	31,150	37,550	41,950	43,650
ROW DWELLINGS	18,600	22,200	24,650	29,550	35,250	39,300	41,100
WALKUP	16,000	19,800	22,400	26,600	30,700	33,950	35,650
ELEVATOR-STRUCTURE	25,300	29,350	37,250	------	------	------	------
SANTA FE :							
DETACHED AND SEMIDETACHED	19,600	23,500	26,300	31,200	37,600	42,100	43,750
ROW DWELLINGS	18,600	22,200	24,650	29,550	35,250	39,300	41,100
WALKUP	16,000	19,800	22,400	26,600	30,700	33,950	35,650
ELEVATOR-STRUCTURE	25,300	29,350	37,250	------	------	------	------
SILVER CITY :							
DETACHED AND SEMIDETACHED	20,250	24,550	27,250	32,300	39,150	43,650	45,350
ROW DWELLINGS	18,800	22,550	25,150	29,950	35,900	39,900	41,950
WALKUP	16,300	20,300	22,950	27,050	31,350	34,600	36,250
ELEVATOR-STRUCTURE	25,750	29,950	37,950	------	------	------	------
TRUTH OR CONSEQUENCES :							
DETACHED AND SEMIDETACHED	19,000	22,650	25,500	30,200	36,400	40,600	42,200
ROW DWELLINGS	17,600	20,900	23,500	28,050	33,350	37,250	38,900
WALKUP	15,200	18,850	21,350	25,250	29,300	32,250	33,750
ELEVATOR-STRUCTURE	23,900	27,950	35,300	------	------	------	------
FARMINGTON :							
DETACHED AND SEMIDETACHED	20,500	24,600	27,500	32,700	39,400	44,050	45,800
ROW DWELLINGS	19,050	22,700	25,450	30,200	36,150	40,250	42,200
WALKUP	16,350	20,400	23,050	27,400	31,750	34,900	36,500
ELEVATOR-STRUCTURE	25,900	30,350	38,150	------	------	------	------
TERRA AMARILLO :							
DETACHED AND SEMIDETACHED	20,500	24,600	27,400	32,450	39,300	43,900	45,700
ROW DWELLINGS	19,050	22,700	25,450	30,200	36,200	40,250	42,250
WALKUP	16,450	20,400	23,050	27,350	31,550	34,850	36,500
ELEVATOR-STRUCTURE	25,850	30,200	38,100	------	------	------	------
TAOS :							
DETACHED AND SEMIDETACHED	23,200	27,700	30,950	36,750	44,500	49,550	51,500
ROW DWELLINGS	21,500	25,850	28,750	34,100	41,050	45,550	47,800
WALKUP	18,300	22,550	25,700	30,250	35,100	38,600	40,600
ELEVATOR-STRUCTURE	25,700	30,050	37,900	------	------	------	------
SOCORRO :							
DETACHED AND SEMIDETACHED	19,000	22,650	25,500	30,200	36,400	40,600	42,200
ROW DWELLINGS	17,600	20,900	23,500	28,050	33,350	37,250	38,900
WALKUP	15,200	18,850	21,350	25,250	29,300	32,250	33,750
ELEVATOR-STRUCTURE	23,900	27,950	35,300	------	------	------	------
RUIDOSO :							
DETACHED AND SEMIDETACHED	20,500	24,600	27,400	32,450	39,300	43,900	45,700
ROW DWELLINGS	19,050	22,700	25,450	30,200	36,200	40,250	42,250
WALKUP	16,450	20,400	23,050	27,350	31,550	34,850	36,500
ELEVATOR-STRUCTURE	25,850	30,200	38,100	------	------	------	------
OKLAHOMA							
OKLAHOMA CITY :							
DETACHED AND SEMIDETACHED	18,700	22,550	28,000	33,350	40,050	44,700	46,650
ROW DWELLINGS	16,050	19,350	23,750	28,400	34,050	38,050	39,650
WALKUP	15,500	19,250	24,450	28,950	33,700	37,000	38,850
ELEVATOR-STRUCTURE	26,500	30,800	39,050	------	------	------	------
ADA :							
DETACHED AND SEMIDETACHED	19,050	22,700	28,300	33,650	40,500	45,250	47,050
ROW DWELLINGS	16,700	20,200	24,950	29,750	35,550	39,650	41,500
WALKUP	16,150	20,350	25,600	30,350	35,350	38,750	40,700
ELEVATOR-STRUCTURE	26,850	31,050	39,250	------	------	------	------
ARDMORE :							
DETACHED AND SEMIDETACHED	18,950	22,700	28,300	33,650	40,500	45,150	47,100
ROW DWELLINGS	17,250	20,700	25,500	30,400	36,500	40,700	42,450
WALKUP	17,100	21,200	26,800	31,750	36,900	40,700	42,550
ELEVATOR-STRUCTURE	27,250	31,600	39,950	------	------	------	------
ENID :							
DETACHED AND SEMIDETACHED	19,500	23,300	28,950	34,650	41,650	46,400	48,300
ROW DWELLINGS	17,000	20,550	25,150	30,150	36,150	40,250	42,100
WALKUP	15,650	19,600	24,550	29,350	34,100	37,500	39,250
ELEVATOR-STRUCTURE	27,700	31,850	40,500	------	------	------	------
GUYMON :							
DETACHED AND SEMIDETACHED	19,850	23,800	29,800	35,300	42,450	47,500	49,450
ROW DWELLINGS	17,400	20,800	25,600	30,550	36,750	40,950	42,700
WALKUP	16,850	20,700	26,350	31,200	36,200	40,050	41,950
ELEVATOR-STRUCTURE	28,100	32,700	41,250	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VI--CONTINUED							
OKLAHOMA --CONTINUED							
LAWTON :							
DETACHED AND SEMIDETACHED----------------	18,850	22,850	28,200	33,650	40,550	45,150	47,050
ROW DWELLINGS----------------------------	16,350	19,700	24,150	28,900	34,700	38,650	40,450
WALKUP-----------------------------------	15,650	19,750	24,900	29,400	34,200	37,600	39,600
ELEVATOR-STRUCTURE-----------------------	26,800	31,100	39,350	------	------	------	------
SHAWNEE :							
DETACHED AND SEMIDETACHED----------------	19,300	22,950	28,550	34,000	40,900	45,700	47,600
ROW DWELLINGS----------------------------	16,700	20,200	24,950	29,750	35,550	39,650	41,500
WALKUP-----------------------------------	16,150	20,350	25,600	30,350	35,350	38,750	40,700
ELEVATOR-STRUCTURE-----------------------	27,100	31,400	39,600	------	------	------	------
STILLWATER :							
DETACHED AND SEMIDETACHED----------------	19,300	22,950	28,550	34,000	40,900	45,700	47,600
ROW DWELLINGS----------------------------	16,700	20,200	24,950	29,750	35,550	39,650	41,500
WALKUP-----------------------------------	16,150	20,350	25,600	30,350	35,350	38,750	40,700
ELEVATOR-STRUCTURE-----------------------	27,100	31,400	39,600	------	------	------	------
WOODWARD :							
DETACHED AND SEMIDETACHED----------------	19,650	23,500	29,250	35,000	42,100	46,850	48,750
ROW DWELLINGS----------------------------	17,000	20,550	25,150	30,150	36,150	40,250	42,100
WALKUP-----------------------------------	16,450	20,550	25,900	30,750	35,750	39,300	41,300
ELEVATOR-STRUCTURE-----------------------	27,950	32,100	40,800	------	------	------	------
TULSA :							
DETACHED AND SEMIDETACHED----------------	18,550	22,500	27,950	33,100	39,950	44,350	46,300
ROW DWELLINGS----------------------------	16,350	19,950	24,450	29,050	34,900	38,900	40,750
WALKUP-----------------------------------	15,900	19,850	25,000	29,600	34,450	37,950	39,800
ELEVATOR-STRUCTURE-----------------------	26,900	31,050	39,300	------	------	------	------
BARTLESVILLE :							
DETACHED AND SEMIDETACHED----------------	19,350	23,350	28,900	34,450	41,300	46,050	48,100
ROW DWELLINGS----------------------------	17,200	20,900	25,600	30,900	36,600	40,800	42,750
WALKUP-----------------------------------	16,000	20,050	25,100	29,850	34,800	38,250	40,050
ELEVATOR-STRUCTURE-----------------------	28,000	32,250	40,900	------	------	------	------
MCALESTER :							
DETACHED AND SEMIDETACHED----------------	19,300	23,050	28,600	34,100	40,850	45,600	47,500
ROW DWELLINGS----------------------------	17,200	20,700	25,600	30,550	36,600	40,800	42,700
WALKUP-----------------------------------	15,550	19,500	24,500	29,000	33,650	36,900	38,800
ELEVATOR-STRUCTURE-----------------------	27,600	32,150	40,700	------	------	------	------
MUSKOGEE :							
DETACHED AND SEMIDETACHED----------------	19,250	23,150	28,800	34,100	41,050	45,750	47,750
ROW DWELLINGS----------------------------	17,750	21,500	26,700	31,700	37,950	42,500	44,300
WALKUP-----------------------------------	15,900	19,850	24,900	29,500	34,350	37,750	39,700
ELEVATOR-STRUCTURE-----------------------	27,650	32,100	40,700	------	------	------	------
TEXAS							
DALLAS :							
DETACHED AND SEMIDETACHED----------------	16,900	20,450	25,200	30,100	36,200	40,400	42,100
ROW DWELLINGS----------------------------	14,900	17,750	22,150	26,400	31,850	35,450	37,000
WALKUP-----------------------------------	14,400	18,000	22,700	26,850	31,250	34,200	35,900
ELEVATOR-STRUCTURE-----------------------	25,750	29,900	37,950	------	------	------	------
SHERMAN :							
DETACHED AND SEMIDETACHED----------------	17,200	20,750	25,600	30,550	36,750	40,750	42,750
ROW DWELLINGS----------------------------	14,750	17,750	22,100	26,250	31,600	35,300	36,950
WALKUP-----------------------------------	14,400	18,000	22,650	26,850	31,250	34,100	35,850
ELEVATOR-STRUCTURE-----------------------	26,200	30,600	38,550	------	------	------	------
TYLER :							
DETACHED AND SEMIDETACHED----------------	16,300	19,800	24,400	29,200	35,100	38,950	40,650
ROW DWELLINGS----------------------------	14,600	17,500	21,750	25,800	31,100	34,600	36,150
WALKUP-----------------------------------	13,600	16,900	21,450	25,250	29,250	32,100	34,000
ELEVATOR-STRUCTURE-----------------------	26,700	31,150	39,450	------	------	------	------
WACO :							
DETACHED AND SEMIDETACHED----------------	16,250	19,650	24,350	29,000	34,950	38,800	40,600
ROW DWELLINGS----------------------------	14,450	17,400	21,550	25,750	30,950	34,400	36,000
WALKUP-----------------------------------	13,600	17,000	21,450	25,250	29,550	32,100	33,900
ELEVATOR-STRUCTURE-----------------------	26,750	30,350	38,350	------	------	------	------
FORT WORTH :							
DETACHED AND SEMIDETACHED----------------	16,850	20,100	25,050	29,900	35,800	40,000	41,750
ROW DWELLINGS----------------------------	14,750	17,650	21,950	26,200	31,350	35,050	36,700
WALKUP-----------------------------------	14,300	17,750	22,500	26,650	30,850	34,050	35,500
ELEVATOR-STRUCTURE-----------------------	28,250	32,750	41,600	------	------	------	------
ABILENE :							
DETACHED AND SEMIDETACHED----------------	17,500	20,950	26,000	30,950	37,250	41,650	43,150
ROW DWELLINGS----------------------------	15,250	18,200	22,650	27,000	32,500	36,350	37,750
WALKUP-----------------------------------	13,450	16,850	21,300	25,050	29,050	32,100	33,550
ELEVATOR-STRUCTURE-----------------------	29,300	33,900	43,000	------	------	------	------
SAN ANGELO :							
DETACHED AND SEMIDETACHED----------------	17,200	20,750	25,800	30,800	36,900	41,300	43,150
ROW DWELLINGS----------------------------	15,400	18,350	22,800	27,100	32,750	36,550	38,200
WALKUP-----------------------------------	14,050	17,400	21,950	26,150	30,400	33,350	34,900
ELEVATOR-STRUCTURE-----------------------	29,500	34,300	43,300	------	------	------	------
WICHITA FALLS :							
DETACHED AND SEMIDETACHED----------------	17,500	20,850	26,100	30,950	37,200	41,650	43,350
ROW DWELLINGS----------------------------	15,400	18,350	22,800	27,100	32,750	36,550	38,200
WALKUP-----------------------------------	15,600	19,550	24,650	29,200	34,050	37,400	39,050
ELEVATOR-STRUCTURE-----------------------	29,500	34,300	43,300	------	------	------	------
HOUSTON							
DETACHED AND SEMIDETACHED----------------	17,700	21,400	26,300	31,300	37,700	42,150	43,900
ROW DWELLINGS----------------------------	15,450	18,650	23,100	27,400	32,950	36,600	38,350
WALKUP-----------------------------------	14,150	17,800	22,400	26,600	30,700	33,950	35,600
ELEVATOR-STRUCTURE-----------------------	27,950	32,700	41,150	------	------	------	------
BEAUMONT :							
DETACHED AND SEMIDETACHED----------------	18,150	21,900	27,100	32,100	38,850	43,250	45,100
ROW DWELLINGS----------------------------	15,750	19,100	23,550	28,100	33,750	37,550	39,300
WALKUP-----------------------------------	14,450	18,150	22,850	27,100	31,300	34,600	36,150
ELEVATOR-STRUCTURE-----------------------	28,750	33,500	42,300	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VI--CONTINUED							
TEXAS --CONTINUED							
BRYAN :							
DETACHED AND SEMIDETACHED	20,950	25,300	31,250	37,150	44,850	50,050	51,900
ROW DWELLINGS	16,600	20,150	24,900	29,650	35,450	39,450	41,250
WALKUP	13,100	16,350	20,650	24,500	28,400	31,300	32,800
ELEVATOR-STRUCTURE	27,550	32,200	40,550	------	------	------	------
EL CAMPO :							
DETACHED AND SEMIDETACHED	19,450	23,300	28,700	34,100	41,250	45,900	48,000
ROW DWELLINGS	15,250	18,600	22,900	27,150	32,750	36,350	38,100
WALKUP	14,750	18,350	23,150	27,400	31,750	34,950	36,850
ELEVATOR-STRUCTURE	27,800	32,350	40,850	------	------	------	------
LUFKIN :							
DETACHED AND SEMIDETACHED	19,050	23,000	28,400	33,800	40,700	45,400	47,600
ROW DWELLINGS	16,600	20,150	25,200	29,600	35,550	39,500	41,350
WALKUP	14,150	17,800	22,450	26,750	30,900	34,100	35,750
ELEVATOR-STRUCTURE	27,950	32,700	41,150	------	------	------	------
TEXAS CITY :							
DETACHED AND SEMIDETACHED	17,700	21,400	26,300	31,300	37,700	42,150	43,900
ROW DWELLINGS	15,450	18,650	23,100	27,400	32,950	36,600	38,350
WALKUP	14,850	18,550	23,450	27,750	32,150	35,550	37,250
ELEVATOR-STRUCTURE	27,950	32,700	41,150	------	------	------	------
LUBBOCK :							
DETACHED AND SEMIDETACHED	17,200	20,600	25,600	30,550	36,750	40,900	42,600
ROW DWELLINGS	14,850	17,800	22,300	26,400	31,650	35,350	37,000
WALKUP	14,500	18,250	22,900	27,150	31,450	34,450	36,150
ELEVATOR-STRUCTURE	24,750	28,750	36,450	------	------	------	------
AMARILLO :							
DETACHED AND SEMIDETACHED	17,150	20,650	25,750	30,700	37,000	41,150	42,850
ROW DWELLINGS	15,850	19,000	23,600	28,050	33,750	37,650	39,250
WALKUP	15,300	19,100	24,150	28,500	33,200	36,500	38,250
ELEVATOR-STRUCTURE	25,300	29,400	37,200	------	------	------	------
EL PASO :							
DETACHED AND SEMIDETACHED	17,200	20,500	25,500	30,300	36,550	40,750	42,550
ROW DWELLINGS	16,550	19,600	24,550	29,150	35,050	39,300	40,800
WALKUP	15,700	19,450	24,600	29,050	33,700	37,050	38,800
ELEVATOR-STRUCTURE	24,100	28,150	35,650	------	------	------	------
MIDLAND :							
DETACHED AND SEMIDETACHED	16,300	19,750	24,450	29,350	35,150	39,150	40,900
ROW DWELLINGS	14,500	17,550	21,600	25,900	30,950	34,650	36,250
WALKUP	14,400	18,150	22,850	26,950	31,400	34,400	36,100
ELEVATOR-STRUCTURE	23,650	27,350	34,750	------	------	------	------
ODESSA :							
DETACHED AND SEMIDETACHED	16,350	19,800	24,450	29,400	35,150	39,200	40,950
ROW DWELLINGS	14,600	17,500	21,650	25,800	30,950	34,600	36,150
WALKUP	14,500	18,000	22,850	27,100	31,350	34,400	36,150
ELEVATOR-STRUCTURE	23,650	27,350	34,750	------	------	------	------
SAN ANTONIO :							
DETACHED AND SEMIDETACHED	16,100	19,300	23,950	28,650	34,450	38,300	39,950
ROW DWELLINGS	18,050	17,600	21,450	25,750	30,900	34,500	35,750
WALKUP	13,550	17,000	21,400	25,300	29,500	32,400	33,900
ELEVATOR-STRUCTURE	23,800	27,700	35,150	------	------	------	------
AUSTIN :							
DETACHED AND SEMIDETACHED	16,750	20,100	24,800	29,600	35,700	39,700	41,350
ROW DWELLINGS	15,000	18,100	22,300	26,550	31,900	35,650	37,150
WALKUP	13,300	16,850	21,000	25,150	29,150	31,850	33,600
ELEVATOR-STRUCTURE	20,850	24,150	30,650	------	------	------	------
CORPUS CHRISTI :							
DETACHED AND SEMIDETACHED	17,450	20,950	26,200	31,100	37,350	41,650	43,250
ROW DWELLINGS	15,750	19,150	23,750	28,150	33,850	37,750	39,250
WALKUP	14,600	18,150	23,000	27,050	31,300	34,500	36,300
ELEVATOR-STRUCTURE	19,400	22,500	28,750	------	------	------	------
DEL RIO :							
DETACHED AND SEMIDETACHED	15,800	18,950	23,500	28,150	33,750	37,650	39,050
ROW DWELLINGS	14,400	17,350	21,450	25,550	30,650	34,150	35,600
WALKUP	13,550	16,950	21,400	25,300	29,500	32,400	34,000
ELEVATOR-STRUCTURE	21,850	25,350	32,300	------	------	------	------
EAGLE PASS :							
DETACHED AND SEMIDETACHED	18,550	22,200	27,500	32,850	39,550	43,950	45,650
ROW DWELLINGS	14,900	18,050	22,250	26,500	31,850	35,550	36,900
WALKUP	13,900	17,650	22,100	26,350	30,550	33,600	35,200
ELEVATOR-STRUCTURE	22,300	26,050	32,950	------	------	------	------
HARLINGEN :							
DETACHED AND SEMIDETACHED	17,450	20,950	25,950	31,100	37,300	41,600	43,250
ROW DWELLINGS	15,000	18,050	22,300	26,750	31,850	35,650	37,150
WALKUP	13,900	17,650	22,200	26,350	30,600	33,700	35,400
ELEVATOR-STRUCTURE	20,800	23,950	30,450	------	------	------	------
JUNCTION :							
DETACHED AND SEMIDETACHED	17,350	20,900	25,850	30,700	37,000	41,200	42,800
ROW DWELLINGS	15,000	18,250	22,500	26,850	32,350	36,000	37,500
WALKUP	14,150	17,750	22,350	26,700	30,900	34,000	35,700
ELEVATOR-STRUCTURE	22,700	26,450	33,400	------	------	------	------
LAREDO :							
DETACHED AND SEMIDETACHED	17,350	20,750	25,800	30,700	36,800	41,100	42,700
ROW DWELLINGS	15,350	18,700	23,050	27,550	32,950	36,800	38,250
WALKUP	13,400	16,850	21,150	25,100	29,250	32,050	33,750
ELEVATOR-STRUCTURE	21,850	25,350	32,300	------	------	------	------
VICTORIA :							
DETACHED AND SEMIDETACHED	16,250	19,700	24,300	29,050	34,800	38,750	40,350
ROW DWELLINGS	15,300	18,600	22,950	27,250	32,900	36,700	38,200
WALKUP	14,400	18,100	22,750	27,050	31,450	34,500	36,300
ELEVATOR-STRUCTURE	22,550	26,300	33,300	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VII							
IOWA							
DES MOINES :							
DETACHED AND SEMIDETACHED	19,500	23,650	29,100	34,750	41,850	46,350	48,600
ROW DWELLINGS	18,650	22,450	27,600	32,900	39,600	44,000	46,000
WALKUP	18,200	22,800	28,900	34,250	39,600	43,450	45,750
ELEVATOR-STRUCTURE	26,350	30,450	38,700	------	------	------	------
BETTENDORF :							
DETACHED AND SEMIDETACHED	20,350	24,600	30,300	36,250	43,600	48,500	50,700
ROW DWELLINGS	19,400	23,300	28,700	34,100	41,250	45,950	47,900
WALKUP	19,100	23,700	30,150	35,500	41,200	45,300	47,650
ELEVATOR-STRUCTURE	27,200	31,500	39,850	------	------	------	------
CEDAR RAPIDS :							
DETACHED AND SEMIDETACHED	20,250	24,400	30,200	35,750	43,100	48,000	50,100
ROW DWELLINGS	19,300	23,250	28,450	33,900	40,850	45,550	47,600
WALKUP	18,250	22,700	28,850	35,350	40,900	43,300	45,450
ELEVATOR-STRUCTURE	27,000	31,300	39,700	------	------	------	------
COUNCIL BLUFFS :							
DETACHED AND SEMIDETACHED	19,600	23,650	29,100	34,750	41,950	46,400	48,600
ROW DWELLINGS	18,600	22,400	27,600	33,150	39,650	44,350	46,200
WALKUP	18,150	22,700	28,900	34,150	39,500	43,500	45,650
ELEVATOR-STRUCTURE	26,400	30,700	38,700	------	------	------	------
DAVENPORT :							
DETACHED AND SEMIDETACHED	20,250	24,400	30,200	35,750	43,100	48,000	50,100
ROW DWELLINGS	19,250	23,250	28,500	33,950	40,800	45,550	47,550
WALKUP	19,000	23,600	29,950	36,750	42,600	45,100	47,350
ELEVATOR-STRUCTURE	27,200	31,500	39,850	------	------	------	------
DUBUQUE :							
DETACHED AND SEMIDETACHED	20,250	24,400	30,200	35,750	43,100	48,000	50,100
ROW DWELLINGS	19,250	23,250	28,500	33,950	40,800	45,550	47,550
WALKUP	19,000	23,600	29,950	36,750	42,600	45,100	47,350
ELEVATOR-STRUCTURE	26,650	31,100	39,350	------	------	------	------
MASON CITY :							
DETACHED AND SEMIDETACHED	20,250	24,400	30,200	35,750	43,100	48,000	50,100
ROW DWELLINGS	19,250	23,250	28,500	33,950	40,800	45,550	47,550
WALKUP	18,850	23,550	29,950	36,900	42,650	45,100	47,450
ELEVATOR-STRUCTURE	26,650	31,100	39,350	------	------	------	------
SIOUX CITY :							
DETACHED AND SEMIDETACHED	20,250	24,400	30,200	35,750	43,100	48,000	50,100
ROW DWELLINGS	19,100	22,950	28,300	33,750	40,600	45,300	47,250
WALKUP	18,850	23,350	29,700	36,650	42,350	44,850	47,100
ELEVATOR-STRUCTURE	26,650	31,100	39,350	------	------	------	------
WATERLOO :							
DETACHED AND SEMIDETACHED	20,250	24,400	30,200	35,750	43,100	48,000	50,100
ROW DWELLINGS	19,250	23,250	28,500	33,950	40,800	45,550	47,550
WALKUP	19,000	23,600	29,950	36,750	42,600	45,100	47,350
ELEVATOR-STRUCTURE	26,650	31,100	39,350	------	------	------	------
KANSAS							
KANSAS CITY :							
DETACHED AND SEMIDETACHED	20,600	25,000	30,800	36,600	44,100	49,000	51,300
ROW DWELLINGS	18,500	22,150	27,350	32,600	39,250	43,600	45,550
WALKUP	19,400	23,950	30,600	36,100	41,800	46,150	48,500
ELEVATOR-STRUCTURE	29,050	33,600	42,550	------	------	------	------
TOPEKA :							
DETACHED AND SEMIDETACHED	19,450	23,400	29,000	34,450	41,550	46,250	48,350
ROW DWELLINGS	18,750	22,350	27,750	32,950	39,700	44,350	46,350
WALKUP	18,100	22,800	29,000	34,050	39,450	43,750	45,650
ELEVATOR-STRUCTURE	26,550	30,700	38,850	------	------	------	------
GARDEN CITY :							
DETACHED AND SEMIDETACHED	18,150	21,900	27,100	32,250	38,900	43,150	45,250
ROW DWELLINGS	17,500	21,000	25,900	30,900	37,150	41,600	43,200
WALKUP	17,200	21,300	26,950	32,000	37,100	40,850	42,850
ELEVATOR-STRUCTURE	24,900	28,750	36,300	------	------	------	------
PITTSBURG :							
DETACHED AND SEMIDETACHED	17,850	21,550	26,650	31,750	38,200	42,450	44,450
ROW DWELLINGS	17,250	20,650	25,500	30,200	36,550	40,800	42,550
WALKUP	16,750	20,950	26,550	31,250	36,400	40,200	42,050
ELEVATOR-STRUCTURE	24,250	28,200	35,600	------	------	------	------
SALINA :							
DETACHED AND SEMIDETACHED	17,850	21,550	26,650	31,900	38,400	42,500	44,650
ROW DWELLINGS	17,300	20,700	25,700	30,400	36,600	40,900	42,750
WALKUP	16,850	21,000	26,800	31,400	36,550	40,200	42,100
ELEVATOR-STRUCTURE	24,500	28,300	35,700	------	------	------	------
WICHITA :							
DETACHED AND SEMIDETACHED	18,750	22,600	28,150	33,350	40,150	44,700	46,900
ROW DWELLINGS	17,950	21,600	26,850	31,750	38,450	42,800	44,650
WALKUP	17,550	22,050	27,950	32,950	38,200	42,100	44,150
ELEVATOR-STRUCTURE	24,250	28,200	35,600	------	------	------	------
MISSOURI							
KANSAS CITY :							
DETACHED AND SEMIDETACHED	20,600	25,000	30,800	36,600	44,100	49,000	51,300
ROW DWELLINGS	21,250	25,450	31,550	37,450	45,050	50,200	52,400
WALKUP	19,400	24,050	30,600	36,100	41,800	46,150	48,600
ELEVATOR-STRUCTURE	29,050	33,600	42,550	------	------	------	------
JOPLIN :							
DETACHED AND SEMIDETACHED	19,100	23,100	28,700	34,000	40,950	45,700	47,750
ROW DWELLINGS	19,850	23,650	29,350	35,050	42,100	46,850	48,850
WALKUP	18,150	22,350	28,600	33,650	39,050	42,900	45,200
ELEVATOR-STRUCTURE	27,050	31,400	39,700	------	------	------	------
ST. JOSEPH :							
DETACHED AND SEMIDETACHED	19,900	23,850	29,400	35,050	42,250	47,100	49,300
ROW DWELLINGS	20,500	24,400	30,200	35,850	43,300	48,250	50,250
WALKUP	18,650	23,250	29,450	34,750	40,450	44,450	46,750
ELEVATOR-STRUCTURE	27,800	32,250	40,850	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VII--CONTINUED							
MISSOURI --CONTINUED							
SEDALIA							
DETACHED AND SEMIDETACHED	19,900	23,850	29,400	35,050	42,250	47,100	49,300
ROW DWELLINGS	20,500	24,400	30,200	35,850	43,300	48,250	50,250
WALKUP	18,650	23,250	29,450	34,750	40,450	44,450	46,750
ELEVATOR-STRUCTURE	27,800	32,250	40,850	------	------	------	------
SPRINGFIELD							
DETACHED AND SEMIDETACHED	20,000	23,950	29,650	35,350	42,650	47,400	49,550
ROW DWELLINGS	20,550	24,550	30,450	36,250	43,700	48,600	50,650
WALKUP	17,750	22,100	27,850	32,900	38,300	42,200	44,100
ELEVATOR-STRUCTURE	27,550	32,050	40,550	------	------	------	------
ST LOUIS							
DETACHED AND SEMIDETACHED	20,950	25,300	31,150	37,150	44,750	49,750	52,050
ROW DWELLINGS	21,400	25,450	31,700	37,750	45,450	50,800	52,850
WALKUP	20,300	25,350	31,950	37,850	44,000	48,300	50,600
ELEVATOR-STRUCTURE	28,600	33,150	41,850	------	------	------	------
CAPE GIRARDEAU							
DETACHED AND SEMIDETACHED	19,750	23,950	29,700	35,350	42,600	47,550	49,700
ROW DWELLINGS	20,550	24,450	30,200	36,050	43,100	48,100	50,300
WALKUP	19,350	24,100	30,250	36,050	41,950	45,850	48,300
ELEVATOR-STRUCTURE	27,400	31,700	40,000	------	------	------	------
COLUMBIA							
DETACHED AND SEMIDETACHED	20,600	24,800	30,700	36,700	44,150	49,000	51,350
ROW DWELLINGS	20,950	25,150	31,050	37,100	44,500	49,700	51,850
WALKUP	20,100	25,000	31,500	37,450	43,500	47,550	49,800
ELEVATOR-STRUCTURE	27,400	31,700	40,150	------	------	------	------
KIRKSVILLE							
DETACHED AND SEMIDETACHED	20,600	24,800	30,700	36,700	44,150	49,000	51,350
ROW DWELLINGS	20,950	25,150	31,050	37,100	44,500	49,700	51,850
WALKUP	20,200	25,050	31,750	37,600	43,650	48,000	50,300
ELEVATOR-STRUCTURE	27,400	31,700	40,150	------	------	------	------
ROLLA							
DETACHED AND SEMIDETACHED	18,700	22,600	28,050	33,300	40,000	44,450	46,550
ROW DWELLINGS	19,150	22,950	28,450	33,700	40,750	45,450	47,450
WALKUP	18,250	22,600	28,650	33,850	39,400	43,250	45,350
ELEVATOR-STRUCTURE	25,150	29,100	36,750	------	------	------	------
NEBRASKA							
OMAHA							
DETACHED AND SEMIDETACHED	20,600	24,800	30,550	36,550	43,950	48,800	51,050
ROW DWELLINGS	18,000	21,600	26,650	31,800	38,450	42,600	44,450
WALKUP	19,150	23,900	30,250	35,750	41,400	45,600	47,850
ELEVATOR-STRUCTURE	27,250	31,700	40,100	------	------	------	------
GRAND ISLAND							
DETACHED AND SEMIDETACHED	21,600	25,900	31,850	37,900	45,850	50,850	53,350
ROW DWELLINGS	19,000	22,900	28,350	33,750	40,750	45,150	47,200
WALKUP	19,850	24,950	31,650	37,250	43,300	47,550	49,950
ELEVATOR-STRUCTURE	28,200	32,800	41,250	------	------	------	------
LINCOLN							
DETACHED AND SEMIDETACHED	20,450	24,750	30,350	36,350	43,600	48,450	50,850
ROW DWELLINGS	18,150	21,850	26,750	32,000	38,600	42,750	44,700
WALKUP	18,250	22,650	28,650	34,050	39,350	43,500	45,550
ELEVATOR-STRUCTURE	27,000	31,250	39,250	------	------	------	------
MACY							
DETACHED AND SEMIDETACHED	24,600	29,600	36,600	43,650	52,600	58,850	61,400
ROW DWELLINGS	21,500	26,000	32,050	38,300	45,900	51,150	53,250
WALKUP	22,450	27,900	35,350	41,900	48,600	53,850	54,750
ELEVATOR-STRUCTURE	32,350	37,400	47,300	------	------	------	------
NORFOLK							
DETACHED AND SEMIDETACHED	20,850	25,150	31,100	37,050	44,650	49,850	52,050
ROW DWELLINGS	18,300	22,000	27,150	32,400	38,900	43,350	45,150
WALKUP	18,900	23,400	29,700	35,050	40,850	45,200	47,250
ELEVATOR-STRUCTURE	28,600	33,000	41,950	------	------	------	------
NORTH PLATTE							
DETACHED AND SEMIDETACHED	18,900	22,750	28,050	33,600	40,400	45,050	47,150
ROW DWELLINGS	17,050	20,500	25,300	30,250	36,200	40,400	42,200
WALKUP	18,600	23,000	29,400	34,800	40,150	44,500	46,700
ELEVATOR-STRUCTURE	27,550	31,900	40,500	------	------	------	------
SCOTTSBLUFF							
DETACHED AND SEMIDETACHED	21,300	25,700	31,450	37,550	45,200	50,300	52,500
ROW DWELLINGS	18,500	22,150	27,400	32,750	39,250	43,700	45,550
WALKUP	19,700	24,300	31,000	36,850	42,400	46,850	49,300
ELEVATOR-STRUCTURE	27,800	32,200	38,500	------	------	------	------
REGION VIII							
COLORADO							
DENVER							
DETACHED AND SEMIDETACHED	21,300	25,650	31,400	37,400	45,100	50,300	52,650
ROW DWELLINGS	19,050	22,800	28,300	33,550	40,400	44,950	47,100
WALKUP	18,350	22,900	28,950	34,250	39,450	43,600	45,700
ELEVATOR-STRUCTURE	30,400	35,450	44,700	------	------	------	------
GRAND JUNCTION							
DETACHED AND SEMIDETACHED	21,100	25,450	31,350	37,400	45,000	50,050	52,250
ROW DWELLINGS	19,350	23,100	28,450	34,100	41,150	45,500	47,800
WALKUP	18,600	23,100	29,200	34,600	40,000	44,100	46,300
ELEVATOR-STRUCTURE	30,750	35,700	45,000	------	------	------	------
ASPEN-VAIL							
DETACHED AND SEMIDETACHED	22,200	26,850	33,100	39,350	47,450	52,850	55,300
ROW DWELLINGS	20,500	24,600	30,300	36,200	43,650	48,550	50,900
WALKUP	19,750	24,650	31,200	36,750	42,700	47,000	49,400
ELEVATOR-STRUCTURE	32,550	37,850	48,050	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION VIII--CONTINUED							
MONTANA							
HELENA :							
DETACHED AND SEMIDETACHED	22,750	27,400	33,850	40,300	48,700	54,250	56,600
ROW DWELLINGS	19,600	23,300	29,200	34,650	41,750	46,350	48,650
WALKUP	18,200	22,900	29,100	34,250	39,600	43,750	45,650
ELEVATOR-STRUCTURE	28,100	32,650	41,450	------	------	------	------
BILLINGS :							
DETACHED AND SEMIDETACHED	21,550	26,050	32,050	38,250	45,950	51,050	53,500
ROW DWELLINGS	18,750	22,200	27,650	32,800	39,550	44,050	46,050
WALKUP	17,100	21,650	27,500	32,400	37,300	41,400	43,300
ELEVATOR-STRUCTURE	26,650	30,750	39,250	------	------	------	------
GREAT FALLS :							
DETACHED AND SEMIDETACHED	22,750	27,350	33,850	40,350	48,300	53,950	56,400
ROW DWELLINGS	19,900	23,600	29,200	35,100	42,200	46,800	49,400
WALKUP	18,350	23,050	29,100	34,200	39,650	43,950	45,800
ELEVATOR-STRUCTURE	28,150	32,500	41,450	------	------	------	------
MISSOULA :							
DETACHED AND SEMIDETACHED	21,100	25,500	31,300	37,400	44,950	49,900	52,300
ROW DWELLINGS	18,350	21,650	27,050	32,050	38,650	43,100	45,050
WALKUP	16,750	21,200	27,000	31,700	36,600	40,600	42,400
ELEVATOR-STRUCTURE	26,100	30,150	38,400	------	------	------	------
NORTH DAKOTA							
FARGO :							
DETACHED AND SEMIDETACHED	24,200	28,950	35,850	43,100	51,800	57,250	60,200
ROW DWELLINGS	19,650	23,850	29,350	34,850	42,150	46,650	48,850
WALKUP	18,150	22,800	28,350	33,600	39,350	43,250	45,500
ELEVATOR-STRUCTURE	28,300	33,000	41,600	------	------	------	------
BISMARCK :							
DETACHED AND SEMIDETACHED	26,050	31,350	38,400	46,150	55,600	61,550	64,550
ROW DWELLINGS	21,200	25,650	31,500	37,600	45,500	50,350	52,750
WALKUP	19,700	24,650	30,400	36,250	42,650	46,700	49,200
ELEVATOR-STRUCTURE	30,350	35,250	44,600	------	------	------	------
DICKINSON :							
DETACHED AND SEMIDETACHED	25,250	30,400	37,550	45,050	54,050	60,050	63,050
ROW DWELLINGS	20,550	25,000	30,900	36,600	44,200	48,900	51,150
WALKUP	19,100	24,000	29,750	35,150	41,500	45,650	47,800
ELEVATOR-STRUCTURE	29,750	34,650	43,700	------	------	------	------
SOUTH DAKOTA							
SIOUX FALLS :							
DETACHED AND SEMIDETACHED	24,100	28,950	35,750	42,650	51,200	57,100	59,650
ROW DWELLINGS	22,000	26,600	33,000	39,250	47,400	52,150	55,050
WALKUP	19,050	23,700	30,050	35,650	41,300	45,600	47,850
ELEVATOR-STRUCTURE	27,500	32,000	40,350	------	------	------	------
PIERRE :							
DETACHED AND SEMIDETACHED	25,400	30,850	37,800	45,000	54,500	60,550	63,050
ROW DWELLINGS	23,000	27,850	34,300	40,800	49,350	54,650	57,250
WALKUP	19,200	24,050	30,200	35,900	41,600	45,750	48,200
ELEVATOR-STRUCTURE	28,000	32,450	41,150	------	------	------	------
RAPID CITY :							
DETACHED AND SEMIDETACHED	24,300	29,500	36,350	43,050	51,750	57,850	60,350
ROW DWELLINGS	22,250	27,200	33,350	40,100	47,950	52,900	55,850
WALKUP	19,950	25,050	31,600	37,250	43,100	47,650	50,200
ELEVATOR-STRUCTURE	27,850	32,400	40,950	------	------	------	------
UTAH							
SALT LAKE CITY :							
DETACHED AND SEMIDETACHED	20,250	24,450	30,150	36,100	43,450	48,150	50,600
ROW DWELLINGS	18,200	21,850	27,050	32,450	38,700	43,000	45,050
WALKUP	16,550	20,750	26,450	31,250	36,200	39,900	41,950
ELEVATOR-STRUCTURE	24,750	28,900	36,550	------	------	------	------
CEDAR CITY :							
DETACHED AND SEMIDETACHED	22,350	26,950	33,200	39,500	47,600	53,100	55,600
ROW DWELLINGS	17,500	21,150	26,000	31,200	37,300	41,650	43,350
WALKUP	18,300	23,000	29,150	34,200	39,850	43,800	46,100
ELEVATOR-STRUCTURE	27,250	31,750	40,250	------	------	------	------
VERNAL :							
DETACHED AND SEMIDETACHED	21,450	25,900	31,900	38,100	45,900	51,000	53,500
ROW DWELLINGS	16,950	20,450	25,200	30,100	36,200	40,250	42,300
WALKUP	17,650	22,100	28,000	32,900	38,350	42,150	44,400
ELEVATOR-STRUCTURE	26,200	30,600	38,700	------	------	------	------
WYOMING							
CASPER :							
DETACHED AND SEMIDETACHED	24,850	30,050	37,050	44,100	53,050	59,100	62,000
ROW DWELLINGS	21,300	25,550	31,750	37,750	45,350	50,550	52,850
WALKUP	19,350	24,300	30,850	36,200	42,150	46,350	48,650
ELEVATOR-STRUCTURE	28,400	33,100	42,050	------	------	------	------
CHEYENNE :							
DETACHED AND SEMIDETACHED	23,800	28,900	35,500	42,350	51,000	56,800	59,600
ROW DWELLINGS	20,200	24,500	30,450	37,700	43,500	48,200	50,350
WALKUP	18,550	23,350	29,550	34,800	40,300	44,550	46,500
ELEVATOR-STRUCTURE	27,350	31,800	40,250	------	------	------	------
CODY :							
DETACHED AND SEMIDETACHED	25,400	31,000	38,100	45,750	54,950	61,050	64,000
ROW DWELLINGS	22,050	26,300	32,750	38,950	46,700	51,900	54,550
WALKUP	19,950	25,050	31,750	37,350	43,050	47,700	49,750
ELEVATOR-STRUCTURE	29,350	34,200	43,250	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION IX							
ARIZONA							
PHOENIX :							
DETACHED AND SEMIDETACHED	19,250	23,150	28,550	34,000	41,000	45,600	47,800
ROW DWELLINGS	17,450	21,100	26,050	31,150	37,250	41,700	43,450
WALKUP	15,950	19,800	25,200	29,850	34,400	37,950	39,900
ELEVATOR-STRUCTURE	27,700	32,150	40,750	------	------	------	------
CASA GRANDE :							
DETACHED AND SEMIDETACHED	20,100	24,250	29,800	35,550	42,850	47,550	49,950
ROW DWELLINGS	18,250	21,150	27,100	32,300	38,850	43,350	45,200
WALKUP	16,600	20,750	26,350	31,200	36,000	39,700	41,600
ELEVATOR-STRUCTURE	28,850	33,550	42,500	------	------	------	------
DOUGLAS :							
DETACHED AND SEMIDETACHED	19,700	23,700	29,350	34,800	41,850	46,750	49,000
ROW DWELLINGS	18,000	21,750	26,850	31,950	38,400	42,900	44,800
WALKUP	16,450	20,450	25,950	30,650	35,200	38,900	40,900
ELEVATOR-STRUCTURE	28,550	33,050	41,900	------	------	------	------
FLAGSTAFF :							
DETACHED AND SEMIDETACHED	19,550	23,600	29,350	34,700	40,800	46,600	48,900
ROW DWELLINGS	18,000	21,750	26,850	31,950	38,400	42,900	44,800
WALKUP	16,350	20,350	25,950	30,550	35,200	38,950	40,800
ELEVATOR-STRUCTURE	29,550	34,100	43,100	------	------	------	------
KINGMAN :							
DETACHED AND SEMIDETACHED	19,950	24,050	29,550	35,350	42,550	47,200	49,600
ROW DWELLINGS	18,200	21,100	27,050	32,250	38,700	43,250	45,150
WALKUP	16,500	20,650	26,150	30,950	35,650	39,400	41,300
ELEVATOR-STRUCTURE	28,600	33,300	42,200	------	------	------	------
SAFFORD :							
DETACHED AND SEMIDETACHED	20,250	24,200	29,950	35,650	42,800	47,800	50,150
ROW DWELLINGS	18,350	22,300	27,600	32,800	39,350	44,000	45,900
WALKUP	16,650	20,800	26,500	31,350	36,200	39,900	41,900
ELEVATOR-STRUCTURE	29,100	33,900	42,800	------	------	------	------
TUCSON :							
DETACHED AND SEMIDETACHED	19,350	23,300	28,750	34,050	41,100	45,850	48,000
ROW DWELLINGS	18,050	21,800	26,950	32,100	38,550	43,150	45,100
WALKUP	16,100	20,100	25,400	30,000	34,650	38,300	40,050
ELEVATOR-STRUCTURE	32,700	37,950	47,900	------	------	------	------
YUMA :							
DETACHED AND SEMIDETACHED	19,050	22,950	28,350	33,700	40,600	45,200	47,500
ROW DWELLINGS	17,200	20,800	25,750	30,550	36,850	41,050	42,700
WALKUP	15,950	19,650	25,050	29,750	34,250	37,750	39,550
ELEVATOR-STRUCTURE	27,450	32,050	40,450	------	------	------	------
NOGALES :							
DETACHED AND SEMIDETACHED	24,900	29,900	36,900	43,800	52,800	58,950	61,750
ROW DWELLINGS	22,500	27,300	33,600	40,200	48,350	53,850	56,050
WALKUP	20,800	25,750	32,600	38,700	44,750	49,200	51,850
ELEVATOR-STRUCTURE	33,850	39,400	50,000	------	------	------	------
CALIFORNIA							
LOS ANGELES :							
DETACHED AND SEMIDETACHED	25,750	30,600	38,100	45,500	54,650	61,150	63,850
ROW DWELLINGS	25,250	30,600	37,600	44,750	54,000	60,050	62,650
WALKUP	24,550	30,850	38,600	45,850	52,800	58,300	61,250
ELEVATOR-STRUCTURE	38,100	44,350	55,950	------	------	------	------
BAKERSFIELD :							
DETACHED AND SEMIDETACHED	25,350	30,250	37,650	44,950	53,950	60,250	63,100
ROW DWELLINGS	24,850	30,150	37,100	44,100	53,200	59,250	61,850
WALKUP	24,200	30,500	38,000	45,150	52,000	57,450	60,400
ELEVATOR-STRUCTURE	37,950	44,100	55,700	------	------	------	------
INYOKERN :							
DETACHED AND SEMIDETACHED	26,600	31,650	39,400	46,800	56,500	63,250	66,150
ROW DWELLINGS	26,250	31,800	38,900	46,500	55,950	62,250	65,050
WALKUP	25,300	31,800	39,900	47,250	54,500	60,000	63,050
ELEVATOR-STRUCTURE	39,300	45,900	57,850	------	------	------	------
LANCASTER :							
DETACHED AND SEMIDETACHED	25,800	31,050	38,350	45,700	55,050	61,550	64,550
ROW DWELLINGS	25,300	30,700	37,850	45,150	54,200	60,100	63,000
WALKUP	24,750	31,050	38,800	45,950	53,350	58,650	61,600
ELEVATOR-STRUCTURE	38,150	44,550	56,300	------	------	------	------
MOJAVE :							
DETACHED AND SEMIDETACHED	26,450	31,450	39,100	46,550	56,100	62,650	65,350
ROW DWELLINGS	26,000	31,400	38,650	46,300	55,600	61,900	64,600
WALKUP	25,200	31,550	39,600	46,750	53,850	59,600	62,500
ELEVATOR-STRUCTURE	39,000	45,500	57,450	------	------	------	------
OJAI :							
DETACHED AND SEMIDETACHED	23,950	28,650	35,800	42,500	51,150	57,150	59,650
ROW DWELLINGS	23,600	28,650	35,300	42,050	50,500	56,300	58,850
WALKUP	22,900	28,800	36,200	43,050	49,750	54,500	57,500
ELEVATOR-STRUCTURE	36,150	42,100	53,000	------	------	------	------
OXNARD :							
DETACHED AND SEMIDETACHED	25,300	30,250	37,650	44,750	53,850	60,100	63,150
ROW DWELLINGS	24,800	30,100	37,100	44,100	53,100	59,150	61,650
WALKUP	24,150	30,250	38,000	45,000	51,950	57,600	60,300
ELEVATOR-STRUCTURE	37,950	44,100	55,700	------	------	------	------
PASO ROBLES :							
DETACHED AND SEMIDETACHED	25,200	30,150	37,350	44,450	53,350	59,750	62,700
ROW DWELLINGS	24,750	30,100	36,850	44,200	52,750	59,000	61,500
WALKUP	24,100	30,100	37,800	44,600	51,400	56,900	59,600
ELEVATOR-STRUCTURE	38,950	45,450	57,400	------	------	------	------
PIRU :							
DETACHED AND SEMIDETACHED	23,950	28,650	35,800	42,500	51,150	57,150	59,650
ROW DWELLINGS	23,600	28,650	35,300	42,050	50,500	56,300	58,850
WALKUP	22,900	28,800	36,200	43,050	49,750	54,500	57,500
ELEVATOR-STRUCTURE	36,150	42,100	53,000	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
	REGION IX--CONTINUED						
CALIFORNIA --CONTINUED							
RIDGECREST :							
DETACHED AND SEMIDETACHED	24,700	29,450	36,650	43,500	52,700	58,600	61,400
ROW DWELLINGS	24,200	29,350	36,100	42,900	51,650	57,500	59,950
WALKUP	23,450	29,450	37,000	43,850	50,600	55,700	58,500
ELEVATOR-STRUCTURE	39,100	45,700	57,550	------	------	------	------
SAN BERNARDINO :							
DETACHED AND SEMIDETACHED	25,300	30,250	37,650	44,750	53,850	60,100	63,150
ROW DWELLINGS	24,800	30,100	37,100	44,100	53,100	59,150	61,650
WALKUP	24,200	30,500	38,000	45,150	52,000	57,450	60,400
ELEVATOR-STRUCTURE	37,950	44,100	55,700	------	------	------	------
VICTORVILLE :							
DETACHED AND SEMIDETACHED	25,900	30,950	38,350	45,800	55,000	61,350	64,150
ROW DWELLINGS	25,550	30,500	37,850	45,200	54,250	60,500	63,250
WALKUP	26,150	31,350	38,800	46,450	55,700	62,150	64,900
ELEVATOR-STRUCTURE	38,200	44,400	56,300	------	------	------	------
SANTA BARBARA :							
DETACHED AND SEMIDETACHED	25,750	31,000	38,350	45,550	55,000	61,350	64,250
ROW DWELLINGS	25,150	30,800	37,850	44,950	54,200	60,350	62,750
WALKUP	24,650	30,850	38,800	45,700	53,200	58,450	61,500
ELEVATOR-STRUCTURE	38,150	44,550	56,300	------	------	------	------
ARROWHEAD :							
DETACHED AND SEMIDETACHED	26,300	31,600	39,100	46,650	56,200	62,650	65,400
ROW DWELLINGS	26,000	31,200	38,650	46,000	55,500	61,750	64,600
WALKUP	26,550	31,950	39,600	47,200	56,900	63,300	66,100
ELEVATOR-STRUCTURE	38,450	45,300	57,450	------	------	----	------
SANTA MARIA :							
DETACHED AND SEMIDETACHED	25,900	31,000	38,350	45,650	54,800	61,400	64,400
ROW DWELLINGS	25,350	30,900	37,850	45,400	54,200	60,700	63,150
WALKUP	24,700	30,950	38,800	45,850	52,800	58,500	61,300
ELEVATOR-STRUCTURE	38,950	45,450	57,400	------	------	------	------
BARSTOW :							
DETACHED AND SEMIDETACHED	26,000	31,100	38,550	46,150	55,350	61,750	64,500
ROW DWELLINGS	25,650	30,650	38,150	45,500	54,600	60,850	63,650
WALKUP	26,350	31,550	39,100	46,800	56,100	62,550	65,350
ELEVATOR-STRUCTURE	38,450	44,750	56,700	------	------	------	------
TEHACHAPI :							
DETACHED AND SEMIDETACHED	25,900	31,000	38,350	45,650	54,800	61,400	64,400
ROW DWELLINGS	25,350	30,900	37,850	45,400	54,200	60,700	63,150
WALKUP	24,700	30,950	38,800	45,850	52,800	58,500	61,300
ELEVATOR-STRUCTURE	38,950	45,450	57,400	------	------	------	------
BIG BEAR :							
DETACHED AND SEMIDETACHED	26,300	31,600	39,100	46,650	56,200	62,650	65,400
ROW DWELLINGS	26,000	31,200	38,650	46,000	55,500	61,750	64,600
WALKUP	26,550	31,950	39,600	47,250	56,900	63,350	66,150
ELEVATOR-STRUCTURE	38,900	45,300	57,450	------	----	------	------
VENTURA :							
DETACHED AND SEMIDETACHED	25,300	30,250	37,650	44,750	53,850	60,100	63,150
ROW DWELLINGS	24,800	30,100	37,100	44,100	53,100	59,150	61,650
WALKUP	24,200	30,500	38,000	45,150	52,000	57,450	60,400
ELEVATOR-STRUCTURE	37,950	44,100	55,700	-----	------	------	------
SANTA ANA :							
DETACHED AND SEMIDETACHED	25,800	30,800	38,100	45,450	54,800	60,850	63,950
ROW DWELLINGS	25,350	30,650	37,600	44,950	54,100	60,250	62,750
WALKUP	24,650	30,600	38,600	45,500	52,800	58,100	60,850
ELEVATOR-STRUCTURE	38,200	44,200	55,950	- ---	------	------	------
DESERT CENTER :							
DETACHED AND SEMIDETACHED	28,550	34,300	42,450	50,750	61,100	68,000	71,350
ROW DWELLINGS	28,200	33,750	41,950	50,050	60,150	67,100	70,350
WALKUP	28,950	34,750	42,950	51,350	61,700	68,750	72,150
ELEVATOR-STRUCTURE	42,200	49,350	62,300	------	------	------	------
NEEDLES :							
DETACHED AND SEMIDETACHED	28,950	34,700	43,100	51,050	61,500	68,500	71,750
ROW DWELLINGS	27,400	32,800	40,800	48,400	58,250	64,900	68,050
WALKUP	25,850	31,000	38,450	45,550	54,850	61,200	64,050
ELEVATOR-STRUCTURE	34,400	40,200	50,900	------	------	------	------
SACRAMENTO :							
DETACHED AND SEMIDETACHED	20,650	24,750	30,650	36,350	43,850	48,800	51,100
ROW DWELLINGS	20,100	24,250	29,900	35,650	42,850	47,800	49,800
WALKUP	17,100	21,400	27,200	31,900	37,050	40,850	42,800
ELEVATOR-STRUCTURE	35,650	41,500	52,350	------	------	------	------
PLACERVILLE :							
DETACHED AND SEMIDETACHED	20,800	24,900	31,000	36,800	44,350	49,350	51,600
ROW DWELLINGS	20,250	24,450	30,250	36,150	43,300	48,350	50,400
WALKUP	17,700	22,000	28,050	33,000	38,250	42,100	44,100
ELEVATOR-STRUCTURE	36,000	42,050	53,000	------	------	------	------
REDDING :							
DETACHED AND SEMIDETACHED	20,600	24,800	30,650	36,600	44,000	48,850	51,100
ROW DWELLINGS	20,050	24,250	29,900	35,600	42,700	47,650	49,800
WALKUP	17,450	21,700	27,700	32,550	37,700	41,500	43,450
ELEVATOR-STRUCTURE	35,500	41,500	52,350	------	------	------	------
YREKA :							
DETACHED AND SEMIDETACHED	20,750	25,000	30,900	36,700	44,200	49,250	51,400
ROW DWELLINGS	20,150	24,350	30,050	35,800	43,150	47,900	50,150
WALKUP	17,600	21,850	27,850	32,750	37,950	41,800	43,850
ELEVATOR-STRUCTURE	35,750	41,650	52,600	------	------	------	------
SOUTH LAKE TAHOE :							
DETACHED AND SEMIDETACHED	21,300	25,600	31,700	37,550	45,300	50,550	52,800
ROW DWELLINGS	20,650	24,900	30,900	36,750	44,250	49,250	51,450
WALKUP	18,000	22,550	28,600	33,550	39,000	42,900	45,000
ELEVATOR-STRUCTURE	38,000	44,100	55,550	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION IX--CONTINUED							
CALIFORNIA --CONTINUED							
SAN FRANCISCO :							
DETACHED AND SEMIDETACHED	27,100	32,700	40,450	48,150	58,000	64,500	67,350
ROW DWELLINGS	26,650	32,100	39,550	47,200	56,550	63,000	65,900
WALKUP	26,900	33,650	42,450	50,200	58,200	64,100	67,100
ELEVATOR-STRUCTURE	45,650	53,050	66,950	------	------	------	------
EUREKA :							
DETACHED AND SEMIDETACHED	27,250	32,700	40,400	48,150	58,050	64,650	67,600
ROW DWELLINGS	20,650	25,000	30,650	36,650	43,900	49,050	51,150
WALKUP	21,650	26,850	34,000	40,100	46,600	51,250	53,650
ELEVATOR-STRUCTURE	33,950	39,300	49,650	------	------	------	------
SANTA ROSA :							
DETACHED AND SEMIDETACHED	25,200	30,200	37,350	44,450	53,600	59,750	62,450
ROW DWELLINGS	20,300	24,550	30,150	36,000	43,100	48,200	50,300
WALKUP	21,300	26,400	33,450	39,450	45,800	50,400	52,800
ELEVATOR-STRUCTURE	33,350	38,650	48,750	------	------	------	------
FRESNO :							
DETACHED AND SEMIDETACHED	20,800	24,700	30,750	36,550	44,100	48,950	51,350
ROW DWELLINGS	19,350	23,450	28,900	34,450	41,350	46,100	48,200
WALKUP	20,300	25,250	32,000	37,650	43,700	48,050	50,450
ELEVATOR-STRUCTURE	35,800	41,700	52,700	------	------	------	------
MODESTO :							
DETACHED AND SEMIDETACHED	21,250	25,700	31,600	37,550	45,300	50,350	52,750
ROW DWELLINGS	20,750	25,050	30,900	36,850	44,200	49,200	51,700
WALKUP	20,700	25,750	32,600	38,350	44,400	49,200	51,150
ELEVATOR-STRUCTURE	32,600	37,750	47,600	------	------	------	------
OAKLAND-MARIN :							
DETACHED AND SEMIDETACHED	23,650	28,450	35,000	41,650	50,150	55,850	58,450
ROW DWELLINGS	22,350	26,750	33,050	39,450	47,400	52,800	55,250
WALKUP	23,400	28,800	36,500	43,100	50,150	54,950	57,800
ELEVATOR-STRUCTURE	37,200	43,300	54,550	------	------	------	------
SAN JOSE :							
DETACHED AND SEMIDETACHED	22,900	27,500	34,050	40,600	48,850	54,500	56,900
ROW DWELLINGS	22,050	26,750	32,850	39,200	46,950	52,450	54,700
WALKUP	23,200	28,750	36,400	42,950	49,900	54,850	57,450
ELEVATOR-STRUCTURE	35,150	40,750	51,450	------	------	------	------
SANTA CRUZ :							
DETACHED AND SEMIDETACHED	27,700	33,200	41,100	48,950	59,000	65,700	68,700
ROW DWELLINGS	20,900	25,400	31,150	37,250	44,650	49,900	52,000
WALKUP	22,250	27,650	34,950	41,250	47,900	52,700	55,150
ELEVATOR-STRUCTURE	34,950	40,500	51,200	------	------	------	------
SAN DIEGO :							
DETACHED AND SEMIDETACHED	24,750	29,700	36,800	43,750	52,650	58,700	61,250
ROW DWELLINGS	22,500	27,100	33,500	39,700	47,750	53,350	55,850
WALKUP	20,950	26,200	33,300	39,150	45,300	49,950	52,400
ELEVATOR-STRUCTURE	37,750	43,950	55,650	------	------	------	------
EL CAJON :							
DETACHED AND SEMIDETACHED	24,750	29,700	36,800	43,750	52,650	58,700	61,250
ROW DWELLINGS	22,500	27,100	33,500	39,700	47,750	53,350	55,850
WALKUP	21,400	26,900	34,150	40,300	46,700	51,300	53,850
ELEVATOR-STRUCTURE	37,750	43,950	55,650	------	------	------	------
HAWAII							
HONOLULU :							
DETACHED AND SEMIDETACHED	32,050	39,000	48,150	57,250	74,300	76,800	80,350
ROW DWELLINGS	31,150	37,300	46,250	54,850	66,250	73,750	77,050
WALKUP	29,100	36,250	46,000	54,450	62,950	69,450	72,800
ELEVATOR-STRUCTURE	51,550	60,050	76,050	------	------	------	------
HILO :							
DETACHED AND SEMIDETACHED	35,650	42,900	52,950	63,050	75,900	84,300	88,550
ROW DWELLINGS	33,900	41,150	50,800	60,250	72,700	81,050	84,650
WALKUP	32,150	39,900	50,650	59,950	69,450	76,300	80,150
ELEVATOR-STRUCTURE	56,850	65,200	83,500	------	------	------	------
KAUAI :							
DETACHED AND SEMIDETACHED	37,100	45,350	55,400	66,150	79,900	88,600	92,800
ROW DWELLINGS	35,750	43,100	53,450	63,200	76,300	85,300	89,000
WALKUP	32,850	40,750	51,700	61,100	70,900	78,050	81,850
ELEVATOR-STRUCTURE	58,200	67,450	85,350	------	------	------	------
KONO :							
DETACHED AND SEMIDETACHED	36,150	43,900	54,000	64,400	77,550	86,250	90,100
ROW DWELLINGS	34,800	41,950	51,900	61,500	74,350	82,950	86,450
WALKUP	32,850	40,750	51,700	61,100	70,900	78,050	81,850
ELEVATOR-STRUCTURE	58,200	67,450	85,350	------	------	------	------
MAUI :							
DETACHED AND SEMIDETACHED	35,150	42,650	52,350	62,600	75,350	83,750	87,800
ROW DWELLINGS	33,850	40,900	50,600	59,900	72,300	80,650	84,300
WALKUP	31,950	39,700	50,450	59,300	68,850	75,900	79,550
ELEVATOR-STRUCTURE	56,500	65,650	83,050	------	------	------	------
GUAM :							
DETACHED AND SEMIDETACHED	29,600	35,700	44,050	52,350	63,300	70,350	73,700
ROW DWELLINGS	28,450	34,100	42,300	50,200	60,900	67,350	70,550
WALKUP	26,750	33,100	42,000	49,650	57,650	63,200	66,500
ELEVATOR-STRUCTURE	47,150	55,050	69,700	------	------	------	------
NEVADA							
RENO :							
DETACHED AND SEMIDETACHED	22,050	26,300	32,700	38,850	46,900	52,050	54,600
ROW DWELLINGS	20,400	24,800	30,600	36,300	43,800	49,050	51,000
WALKUP	19,550	24,150	30,800	36,400	42,150	46,600	48,600
ELEVATOR-STRUCTURE	39,450	46,000	58,150	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION IX--CONTINUED							
NEVADA --CONTINUED							
LAS VEGAS :							
DETACHED AND SEMIDETACHED	22,800	27,250	34,050	40,450	48,450	54,150	56,750
ROW DWELLINGS	21,550	26,000	31,950	37,950	46,000	51,350	53,600
WALKUP	20,450	25,300	32,150	37,900	44,050	48,550	50,750
ELEVATOR-STRUCTURE	40,750	47,350	59,650	------	------	------	------
REGION X							
ALASKA							
ANCHORAGE :							
DETACHED AND SEMIDETACHED	31,750	38,500	47,450	56,650	67,900	75,600	79,200
ROW DWELLINGS	31,300	37,900	46,600	55,450	67,050	74,500	77,800
WALKUP	28,750	35,850	45,250	53,700	62,200	68,350	72,000
ELEVATOR-STRUCTURE	50,300	58,600	74,100	------	------	------	------
FAIRBANKS :							
DETACHED AND SEMIDETACHED	33,950	40,950	50,400	60,350	72,550	80,500	84,450
ROW DWELLINGS	33,400	40,400	49,700	58,950	71,450	79,350	83,000
WALKUP	30,550	38,150	48,250	57,050	66,200	72,950	76,750
ELEVATOR-STRUCTURE	53,200	61,850	78,150	------	------	------	------
JUNEAU :							
DETACHED AND SEMIDETACHED	30,750	37,200	45,700	54,800	65,650	73,200	76,600
ROW DWELLINGS	30,300	36,650	45,300	53,950	65,150	72,300	75,600
WALKUP	28,750	35,850	45,550	53,700	62,200	68,550	72,000
ELEVATOR-STRUCTURE	48,550	56,600	71,350	------	------	------	------
KETCHIKAN :							
DETACHED AND SEMIDETACHED	30,600	37,050	45,600	54,550	65,250	72,900	76,250
ROW DWELLINGS	30,000	36,400	44,900	53,250	64,400	71,450	74,850
WALKUP	28,800	35,900	45,600	53,900	62,300	68,750	72,300
ELEVATOR-STRUCTURE	49,150	57,150	72,250	------	------	------	------
SITKA :							
DETACHED AND SEMIDETACHED	30,750	37,150	45,750	54,800	65,650	73,200	76,550
ROW DWELLINGS	30,300	36,550	45,050	53,450	64,650	71,850	75,200
WALKUP	29,200	36,450	46,100	54,700	63,200	69,500	72,950
ELEVATOR-STRUCTURE	50,700	58,900	74,550	------	------	------	------
KENAI :							
DETACHED AND SEMIDETACHED	34,750	42,100	52,000	61,850	74,150	83,050	86,550
ROW DWELLINGS	------	------	------	------	------	------	------
WALKUP	------	------	------	------	------	------	------
ELEVATOR-STRUCTURE	------	------	------	------	------	------	------
IDAHO							
BOISE :							
DETACHED AND SEMIDETACHED	22,200	26,750	32,800	39,350	47,250	52,500	55,100
ROW DWELLINGS	20,200	24,350	29,950	35,850	43,200	48,000	50,350
WALKUP	19,750	24,600	31,300	36,950	42,550	47,100	49,250
ELEVATOR-STRUCTURE	29,850	34,800	43,950	------	------	------	------
IDAHO FALLS :							
DETACHED AND SEMIDETACHED	22,800	27,900	34,100	40,800	49,050	54,450	57,050
ROW DWELLINGS	20,850	25,400	31,150	37,200	44,850	49,900	53,250
WALKUP	20,650	25,550	32,400	38,400	44,150	49,000	51,300
ELEVATOR-STRUCTURE	31,100	35,950	45,650	------	------	------	------
MCCALL :							
DETACHED AND SEMIDETACHED	23,150	28,050	34,300	41,200	49,400	54,950	57,650
ROW DWELLINGS	21,300	25,550	31,300	37,550	45,200	50,350	52,750
WALKUP	20,850	25,850	32,650	38,550	44,650	49,400	51,700
ELEVATOR-STRUCTURE	31,250	36,200	46,050	------	------	------	------
POCATELLO :							
DETACHED AND SEMIDETACHED	24,250	29,600	36,300	43,400	52,250	57,950	60,800
ROW DWELLINGS	22,350	27,100	33,150	39,600	47,600	53,100	55,600
WALKUP	21,650	27,300	34,400	40,900	47,100	52,200	54,700
ELEVATOR-STRUCTURE	33,050	38,350	48,500	------	------	------	------
TWIN FALLS :							
DETACHED AND SEMIDETACHED	24,150	29,200	35,950	43,050	51,900	57,650	60,450
ROW DWELLINGS	22,050	26,850	32,900	35,850	47,200	52,700	55,250
WALKUP	21,600	26,900	34,250	40,500	46,700	51,700	54,200
ELEVATOR-STRUCTURE	32,800	38,200	48,150	------	------	------	------
LEWISTON :							
DETACHED AND SEMIDETACHED	23,600	28,650	35,450	41,950	50,800	56,550	59,150
ROW DWELLINGS	21,700	26,200	32,500	38,450	46,300	51,650	54,050
WALKUP	19,650	24,300	31,000	36,450	42,150	46,550	49,000
ELEVATOR-STRUCTURE	30,700	35,900	45,150	------	------	------	------
OREGON							
PORTLAND :							
DETACHED AND SEMIDETACHED	24,000	28,850	35,650	42,650	51,250	56,900	59,650
ROW DWELLINGS	22,400	27,200	33,650	39,750	48,050	53,350	55,700
WALKUP	21,100	26,450	33,450	39,450	45,900	50,450	53,050
ELEVATOR-STRUCTURE	30,500	35,100	44,500	------	------	------	------
PENDLETON :							
DETACHED AND SEMIDETACHED	24,500	29,450	36,350	43,650	52,350	58, 00	61,000
ROW DWELLINGS	25,150	30,650	37,750	44,600	54,100	60,000	62,650
WALKUP	21,600	27,150	34,300	40,400	47,100	51,750	54,400
ELEVATOR-STRUCTURE	33,250	38,450	48,750	------	------	------	------
ONTARIO :							
DETACHED AND SEMIDETACHED	25,450	30,800	37,750	45,450	54,450	60,650	63,600
ROW DWELLINGS	24,200	29,050	35,750	42,500	51,450	57,350	60,100
WALKUP	22,700	28,300	35,650	42,350	48,700	53,950	56,500
ELEVATOR-STRUCTURE	31,850	37,000	47,100	------	------	------	------
BEND :							
DETACHED AND SEMIDETACHED	23,350	28,150	34,650	41,600	49,950	55,350	58,100
ROW DWELLINGS	21,700	26,450	32,750	38,650	46,700	52,000	54,200
WALKUP	20,300	25,150	31,900	37,700	43,900	48,050	50,600
ELEVATOR-STRUCTURE	30,500	35,100	44,500	------	------	------	------

PROTOTYPE PER UNIT COST SCHEDULE

	NUMBER OF BEDROOMS						
	0	1	2	3	4	5	6
REGION X--CONTINUED							
OREGON --CONTINUED							
COOS BAY :							
DETACHED AND SEMIDETACHED	23,400	28,400	34,850	42,050	50,250	55,900	58,500
ROW DWELLINGS	22,850	27,650	34,350	40,450	49,050	54,450	56,800
WALKUP	21,750	27,100	34,300	40,600	47,350	52,000	54,600
ELEVATOR-STRUCTURE	31,200	36,150	45,500	------	------	------	------
EUGENE :							
DETACHED AND SEMIDETACHED	22,400	27,050	33,350	40,050	47,900	53,300	55,800
ROW DWELLINGS	20,850	25,450	31,450	37,200	44,900	49,900	52,100
WALKUP	19,450	23,100	30,950	36,400	42,500	46,700	49,150
ELEVATOR-STRUCTURE	29,850	34,500	43,750	------	------	------	------
MEDFORD :							
DETACHED AND SEMIDETACHED	22,800	27,300	33,650	40,450	45,900	54,000	56,400
ROW DWELLINGS	22,000	26,550	32,850	38,950	47,100	52,350	54,500
WALKUP	20,750	25,700	32,750	38,400	44,750	49,350	52,050
ELEVATOR-STRUCTURE	30,050	34,750	44,150	------	------	------	------
WEST SALEM :							
DETACHED AND SEMIDETACHED	22,950	27,900	34,150	41,150	49,360	54,750	57,400
ROW DWELLINGS	21,500	26,200	32,400	38,200	46,300	51,400	53,650
WALKUP	20,300	25,150	31,800	37,550	43,800	48,050	50,600
ELEVATOR-STRUCTURE	30,550	35,650	44,850	------	------	------	------
WASHINGTON							
SEATTLE :							
DETACHED AND SEMIDETACHED	22,950	27,750	34,100	40,700	48,850	54,250	56,950
ROW DWELLINGS	20,600	25,050	30,750	36,650	44,050	48,900	51,300
WALKUP	20,650	25,050	30,850	36,750	44,150	49,000	51,450
ELEVATOR-STRUCTURE	32,050	37,250	46,950	------	------	------	------
PORT ANGELES :							
DETACHED AND SEMIDETACHED	22,950	27,750	34,100	40,700	48,850	54,250	56,950
ROW DWELLINGS	20,600	25,050	30,750	36,650	44,050	48,900	51,300
WALKUP	20,650	25,050	30,850	36,750	44,150	49,000	51,450
ELEVATOR-STRUCTURE	32,800	38,150	48,300	------	------	------	------
LONGVIEW :							
DETACHED AND SEMIDETACHED	22,700	27,550	33,850	40,450	48,550	53,900	56,600
ROW DWELLINGS	20,450	24,750	30,500	36,450	43,750	48,550	50,950
WALKUP	20,550	24,350	30,600	36,450	43,900	48,650	51,100
ELEVATOR-STRUCTURE	32,950	38,550	48,650	------	------	------	------
ABERDEEN :							
DETACHED AND SEMIDETACHED	22,700	27,550	33,850	40,450	48,550	53,900	56,600
ROW DWELLINGS	20,450	24,750	30,500	36,450	43,750	48,550	50,950
WALKUP	20,550	24,350	30,600	36,450	43,900	48,650	51,100
ELEVATOR-STRUCTURE	32,300	37,400	47,450	------	------	------	------
BELLINGHAM :							
DETACHED AND SEMIDETACHED	22,950	27,750	34,100	40,700	48,850	54,250	56,950
ROW DWELLINGS	20,600	25,050	30,750	36,650	44,050	48,900	51,300
WALKUP	20,650	25,050	30,850	36,750	44,150	49,000	51,450
ELEVATOR-STRUCTURE	32,300	37,400	47,450	------	------	------	------
OLYMPIA :							
DETACHED AND SEMIDETACHED	22,950	27,750	34,100	40,700	48,850	54,250	56,950
ROW DWELLINGS	20,600	25,050	30,750	36,650	44,050	48,900	51,300
WALKUP	20,650	25,050	30,850	36,750	44,150	49,000	51,450
ELEVATOR-STRUCTURE	32,300	37,400	47,450	------	------	------	------
YAKIMA :							
DETACHED AND SEMIDETACHED	23,800	28,800	35,400	42,300	50,850	56,500	59,350
ROW DWELLINGS	21,450	25,950	31,850	38,100	45,750	50,850	53,450
WALKUP	21,500	26,000	32,000	38,150	45,900	51,050	53,600
ELEVATOR-STRUCTURE	33,600	39,100	49,550	------	------	------	------
SPOKANE :							
DETACHED AND SEMIDETACHED	21,900	26,600	32,600	38,950	46,600	52,000	54,550
ROW DWELLINGS	18,700	22,750	27,900	33,350	40,000	44,450	46,650
WALKUP	18,700	22,700	27,850	33,350	39,950	44,350	46,600
ELEVATOR-STRUCTURE	30,550	35,500	45,050	------	------	------	------
CHENEY :							
DETACHED AND SEMIDETACHED	22,300	26,600	33,200	39,650	47,600	52,850	55,500
ROW DWELLINGS	19,050	22,750	28,400	33,850	40,700	45,150	47,450
WALKUP	19,050	22,700	28,350	33,850	40,600	45,100	47,350
ELEVATOR-STRUCTURE	30,950	36,150	45,700	------	------	------	------
KENNEWICK :							
DETACHED AND SEMIDETACHED	24,600	27,000	36,600	43,700	52,400	58,200	61,100
ROW DWELLINGS	21,000	23,100	31,350	37,350	44,850	49,800	52,250
WALKUP	21,000	23,100	31,250	37,300	44,750	49,700	52,200
ELEVATOR-STRUCTURE	32,050	35,250	44,750	------	------	------	------
PULLMAN :							
DETACHED AND SEMIDETACHED	22,850	27,700	34,000	40,600	48,750	54,150	56,850
ROW DWELLINGS	19,550	23,700	29,050	34,700	41,700	46,250	48,600
WALKUP	19,500	23,650	29,000	34,750	41,650	46,300	48,600
ELEVATOR-STRUCTURE	33,650	39,250	49,650	------	------	------	------

federal register

Friday
January 20, 1984

Part V

Environmental Protection Agency

40 CFR Part 60

Standards of Performance for New Stationary Sources; Equipment Leaks of VOC and SO_2 Emissions From Onshore Natural Gas Processing Plants; Proposed Rules

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD-FRL 2307-2]

Standards of Performance for New Stationary Sources; Onshore Natural Gas Processing Plants in the Natural Gas Production Industry; Equipment Leaks of VOC

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule and notice of public hearing.

SUMMARY: The proposed standards would limit emissions of volatile organic compounds (VOC) from specific equipment leaking VOC containing gases or liquids in the natural gas production industry. The proposed standards would require a leak detection and repair program to reduce VOC emissions from pumps, valves, and pressure relief devices; and would specify the use of certain equipment to reduce VOC emission from compressors and open-ended valves or liner. Only equipment located at onshore natural gas processing plants would be covered by the proposed standards. Pieces of equipment that are remotely located (i.e., not located at an onshore natural gas processing plant) would not be covered by the proposed standards.

The proposed standards implement Section 111 of the Clean Air Act and are based on the Administrator's decision that the crude oil and natural gas production industry causes, or contributes significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. As required by Section 111 of the Clean Air Act, the proposed standards are intended to require new, modified, and reconstructed sources in the natural gas production industry to use the best demonstrated system of continuous emission reduction, considering costs, nonair quality health and environmental impacts, and energy requirements.

A public hearing will be held, if requested, to provide interested persons an opportunity for oral presentation of data, views, or arguments concerning the proposed standards.

DATES: *Comments:* Comments must be received on or before April 6, 1984.

Public Hearing. If anyone contacts EPA requesting to speak at a public hearing by Febuary 15, 1984, a public hearing will be held on March 7, 1984, beginning at 9:00 a.m. Persons interested in attending the hearing should call Mrs. Carol Eddinger at (919) 541-5578 to verify that a hearing will occur.

Request to Speak at Hearing. Persons wishing to present oral testimony should contact EPA by Febuary 15, 1984.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate, if possible) to: Central Docket Section (LE-131), Attention: Docket No. A-80-20-B, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

Public Hearing. If anyone contacts EPA requesting to speak at a public hearing by February 15, 1984, the public hearing will be held at EPA Auditorium, corner of Highway 544 and Alexander Drive, RTP, NC. Persons interested in attending the hearing should call Mrs. Carol Eddinger at (919) 541-5578 to verify that a hearing will occur. Persons wishing to present oral testimony should notify Mrs. Carol Eddinger, Standards Development Branch (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5578.

Background Information Document. The background information document (BID) for the proposed standards is contained in the docket and may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, North Carolina 27711, telephone number (919) 541-2777. Please refer to "Equipment Leaks of VOC in the Natural Gas Production Industry—Background Information for Proposed Standards" (EPA-450/3-82-024a).

Docket. Docket No. A-80-20-B, containing supporting information used in developing the proposed standard, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Mr. Gilbert Wood, Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5578.

SUPPLEMENTARY INFORMATION:

Summary of Proposed Standards

The proposed standards of performance would cover equipment leaks of VOC from certain affected facilities within onshore natural gas processing plants (gas plants) in the natural gas production industry. The affected facilities would consist of each new, modified, and reconstructed compressor and each new, modified, and reconstructed process unit. The equipment within a process unit covered by the proposed standards would include pumps, valves, pressure relief devices, open-ended valves and lines, and flanges and connectors. Only compressors and equipment containing or contacting a fluid containing more than 1.0 weight percent VOC (described as "in VOC service") would be regulated by the proposed standards.

The proposed standards would require: (1) a leak detection and repair program for pressure relief devices in gas/vapor service, for valves in gas/vapor service and in light liquid service, and for pumps in light liquid service; and (2) certain equipment for compressors and open-ended valves or lines. Flanges and other connectors, pressure relief devices in liquid service, and pumps and valves in heavy liquid service would be excluded from the routine monitoring requirements but would be subject to the same repair requirements for pressure relief devices in gas/vapor service and pumps and valves in light liquid service. The proposed standards would allow the use of alternative equipment for valves, pumps, and compressors, alternative standards for valves, and a procedure for determining the equivalency of other alternative control measures. "In gas/vapor service" means that the equipment contains organic fluids in the gaseous or vapor state. "In light liquid service" means that the equipment contains VOC liquids which would have more than 10 percent of the liquids evaporated at a boiling point of 150°C, as determined by ASTM Method D-86.

A gas plant that does not fractionate natural gas liquids and that also processes 283,000 standard cubic meters per day (scmd) [10 million standard cubic feet per day (scfd)] of less of field gas would be exempt from the routine monitoring requirements for pressure relief devices, valves, and pumps.

Reciprocating compressors in wet gas service that are located at an onshore natural gas plant that does not have a control device present at the plant site are exempt from the compressor control requirements.

Summary of Environmental, Energy, and Economic Impacts

The proposed standards of performance would reduce equipment leaks of VOC from newly constructed, modified, and reconstructed compressors and newly constructed, modified, and reconstructed process units by about 78 percent from the emission levels that would result with control means currently practiced by the industry. In 1987, the proposed standards would reduce uncontrolled equipment leaks of VOC from newly constructed, modified, and reconstructed facilities by approximately 18,800 megagrams (Mg), a reduction of emissions from 24,200 megagrams of VOC per year (Mg/yr) to 5,400 Mg/yr.

The proposed standards of performance would not increase the energy usage within gas plants. In general, the controls required by the proposed standards do not require energy. Furthermore, the effect of the proposed standards would be to increase efficiency of raw material usage, so that a net positive energy impact would result. The proposed standards would also cause a positive impact on water quality by containment of potential liquid leaks. Implementation of the proposed standards would result in no adverse solid waste impact.

The proposed standards would require a cumulative capital investment of $7.8 million for 180 newly constructed gas plants and up to $2.3 million for 40 modified and reconstructed gas plants through 1987. The industry-wide net annual cost (after accounting for recovery credits) for newly constructed, modified, and reconstructed production facilities is estimated to be approximately $2.5 million in 1987. Average cost effectiveness would be about $130 per megagram of VOC reduction. These costs represent a small impact on the industry and are not expected to deter construction of gas processing plants. No adverse economic impacts are anticipated, and the consumer price of natural gas is not expected to increase more than 0.1 percent.

Rationale

Selection of Sources and Pollutants

The EPA Priority List (40 CFR 60.16, amended at 47 FR 951, January 8, 1982) includes, in order of priority for standards development, various major source categories that the Administrator has determined contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. The order of the listed categories is based on consideration of the three factors specified in Section 111(f) of the Clean Air Act: (1) the quantity of air pollutant emissions that each category will be designed to emit, (2) the extent to which each pollutant may reasonably be anticipated to endanger public health or welfare, and (3) the mobility and competitive nature of each category. The Priority List identifies the source categories for which EPA must promulgate standards of performance. The category "Crude Oil and Natural Gas Production" ranks 29th on the list of 59 source categories.

The crude oil and natural gas production industry encompasses the operations of exploring for crude oil and natural gas products, drilling for these products, removing them from beneath the earth's surface, and processing these products from oil and gas fields for distribution to petroleum refineries and gas pipelines. The crude oil and natural gas production industry is a source of volatile organic compounds (VOC), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), carbon disulfide (CS_2), carbonyl sulfide (COS), and nitrogen oxides (NO_x) emissions. All of these pollutants, except VOC, are considered in standards being developed separately. Thus, the standards proposed with this preamble would apply only to VOC emitted by this industry.

There are several VOC emission points within this industry. These emission points can be divided into three main categories: process, storage, and equipment leaks. Process emission sources include well systems, field oil and gas separators, wash tanks, settling tanks, and other sources. These process sources remove the crude oil and natural gas from beneath the earth and separate gas and water from the crude oil. Best demonstrated control technology has not been identified for process emission points; therefore, these sources have not been considered in developing the proposed standards.

Storage emission sources include field storage tanks, condensate tanks, and cleaned oil tanks. These were addressed during the development of standards of performance for storage of petroleum liquids in Subpart K of 40 CFR 60.

Equipment leaks of VOC can occur from pumps, valves, compressors, open-ended lines or valves, and pressure relief devices used in onshore crude oil and natural gas production. These leaks usually occur due to design or failure of the equipment. Equipment used in crude oil and natural gas production (not to be confused with natural gas processing) are widely dispersed over large areas. The analysis presented in the BID for the principal control technique (leak detection and repair work practices) for equipment leaks of VOC is not appropriate for widely dispersed equipment. The costs and emission reduction numbers for such an analysis are unknown at this time. Thus, the proposed standards do not apply to equipment associated with crude oil and natural gas production. The proposed standards apply only to equipment located at onshore natural gas processing plants.

Based on recent growth projections for onshore natural gas processing plants, about 180 newly constructed facilities and as many as 40 modified or reconstructed facilities could become covered by the proposed standards during the period from 1983 to 1987. If the equipment covered by the proposed standards in these 220 gas processing plants are controlled only by existing maintenance procedures, an estimated 24,200 megagrams of VOC per year would result from these facilities in 1987. These emissions of VOC could be reduced substantially by readily available controls at reasonable costs.

Standards of performance have other benefits in addition to achieving emissions reductions. Standards of performance establish a degree of national uniformity to air pollution standards and, therefore, preclude situations in which some States may attract new industries as a result of having relaxed standards relative to other States. Further, standards of performance provide documentation that reduces uncertainty in case-by-case determinations of best available control technology (BACT) for facilities located in attainment areas and lowest achievable emission rates (LAER) for facilities located in nonattainment areas. This documentation includes identification and comprehensive analyses of alternative emission control technologies, development of associated costs, assessment of economic impacts on the industry and consumers, evaluation and verification of applicable emission test methods, and identification of specific emission limits achievable with alternate technologies.

The rulemaking process that establishes standards of performance assures adequate technical review and promotes participation of representatives of the industry being considered for regulation, government, and the public affected by the industry's emissions. The resultant standards represent a balance in which government resources are applied in a well-publicized national forum to reach a decision on a pollution emission level that allows for a dynamic economy and a healthful environment.

Selection of Affected Facilities

The choice of the affected facility for the proposed standards is based on EPA's interpretation of Section 111 of the Clean Air Act and on the judicial construction of its meaning [ASARCo, Inc., v. EPA, 578 F. 2d 319 (D.C. Cir. 1978)]. Under Section 111, standards of performance for new stationary sources must apply to "new sources;" "source" is defined as "any building, structure, facility, or installation which emits or may emit any air pollutant" [Section 111(a)(3)]. Most industrial plants, however, may consist of numerous facilities—equipment or groups of equipment—that emit air pollutants and that, consequently, may be viewed as "sources." EPA uses the term "affected facility" to designate the equipment or groups of equipment, within a particular kind of plant, chosen as the "source" affected by given standards.

In choosing the affected facility, EPA must decide which equipment, or groups of equipment, is the appropriate unit for separate standards of performance in the particular industrial context involved. EPA must do this by examining the situation in light of the terms and purpose of Section 111 of the Clean Air Act. One major consideration in determining the definition of source is that the use of a narrower designation results in bringing replacement equipment under standards of performance sooner. If, for example, an entire plant is designated at the affected facility, no part of the plant would be covered by the standards unless the plant as a whole is "modified" (see 40 CFR 60.14) or "reconstructed" (see 40 CFR 60.15). The plant as a whole could be considered modified only if the replacement resulted in an increase in the aggregate emissions from the entire plant. The plant as a whole could be considered reconstructed only if the cost of the replacement exceeded 50 percent of the cost of an entire new plant. If, on the other hand, each piece of equipment is designated as an affected facility, then as each piece is replaced, the replacement piece will be a new source subject to the standards, regardless of the cost of the replacement or whether the replacement caused emissions from the plant as a whole to increase. Since the purpose of Section 111 is to minimize emissions by application of the best demonstrated system of emission reduction at all new and modified source (considering cost, nonair quality health and environmental impacts, and energy requirement), there is a presumption that a narrower designation of the affected facility is proper. This ensures that new emission sources within plants will be brought under the coverage of the standards as they are installed. This presumption can be overcome, however, if EPA concludes either that: (a) a broader designation of the affected facility would result in greater emission reduction; or (b) consideration of the other relevant statutory factors (technical feasibility, costs, nonair quality health and environmental impacts, and energy requirements) leads to the conclusion that a broader designation is appropriate.

Affected facilities for standards that would cover equipment leaks of VOC could be defined as individual pieces of equipment, as groups of equipment that are operated in conjunction with each other (process units), or as groups of process units at one location (plant sites).

The alternative of defining the affected facility as separate pieces of equipment, the most narrow designation, was reviewed first. Due to the large number of equipment in a typical process unit, if EPA selected separate pieces of equipment as the basis for defining affected facilities, situations could arise in which replaced equipment in an existing process unit would be subject to the standards, while adjacent equipment would not be subject to the standards. With such a mixture of new and existing equipment, the effort to keep track of equipment covered by the standards and equipment not covered by the standards could be too costly. In addition, implementing a leak detection and repair program, the principal control technique considered for the proposed standards, for a very small proportion of the equipment within a process unit would be costly.

Therefore, EPA considered groups of equipment (with the exception of compressors, discussed below) within each process unit for the designation as an affected facility. This alternative obviates the need for, and the costs of, distinguishing between equipment covered by the standards and equipment not covered. Furthermore, in this case the designation of the affected facility as a process unit is expected to result in emission reductions comparable to the reductions achieved if the affected facility were designated as separate pieces of equipment. Based on these considerations, EPA selected the group of equipment within a process unit as the affected facility for equipment other than compressors.

Compressors, unlike the other equipment, can be easily identified because they are located together and are physically separate from the process unit. An owner or operator, at reasonable costs, could easily keep track of compressors covered by the standards and compressors not covered by the standards, and there are no other reasons for a broader designation of the affected facility. In addition, for existing compressors covered through the reconstruction provisions of 40 CFR 60.15, the reconstruction determination includes a consideration as to whether it is technically or economically feasible for an existing compressor to meet the standards. This could be used to determine which of the few existing compressors might not be designed to allow reasonable retrofitting of the control technique described in Chapter 4 of the BID. If compressors were included among other equipment in defining affected facilities, then an existing compressor could become subject to the standards under the modification provisions, and an independent review could not be used to determine if an existing compressor was not designed to allow reasonable retrofitting of the control techniques. Based on these considerations, EPA selected the individual piece of equipment (i.e., each compressor) as the affected facility for compressors.

In summary, the proposed standards would apply to two types of affected facilities. Each gas plant compressor in VOC service is one type of affected facility. The other type of affected facility comprises all equipment in VOC service, other than compressors, within a process unit. A process unit is defined as equipment assembled for the separation of natural gas liquids from field gas, fractionation of the liquids into natural gas products, or other operation associated with the processing of natural gas products.

More specifically, a process unit has discrete boundaries that consist of the points where process fluid enters from the preceding natural gas processing activity and where the treated process fluid is discharged to storage or for further processing. For example, a separation train is a process unit because a field gas stream enters the separation train, and separate product gas and natural gas liquids are discharged from the train. If further separation of natural gas liquids is performed by fractionation, the fractionation train comprises an additional process unit. Thus, the process unit is used as the basis for defining an affected facility, but the applicability of the proposed standards is limited to specific equipment in VOC service.

The proposed standards would exempt routine changes and additions made for process improvements from the modification provisions of Section 60.14 of the General Provisions of 40 CFR Part 60 if they are made without incurring a "capital expenditure" as defined in the General Provisions. Examples of such changes include those made for increasing the ease of maintenance, improving plant safety, and correcting minor design flaws.

These standards would apply only to equipment with process stream VOC concentrations of 1.0 weight percent or more. VOC means any organic compound that participates in atmospheric photochemical reactions. It is assumed that an organic compound participates in atmospheric photochemical reactions unless the Adminstrator determines that it does not. The Administrator has determined that the following organic compounds have neligible photochemical reactivity: methane; ethane; 1,1,1-trichloroethane; methylene chloride; trichlorofluoromethane; dichlorodifluoromethane; trifluoromethane; trichlorotrifluoroethane; dichlorotetrafluoroethane; and chloropentafluorethane. The 1.0 percent cutoff is intended to exempt equipment in product natural gas service. Product natural gas has much less than 1.0 weight percent VOC; and there is little emission reduction potential associated with controlling equipment in product natural gas service. A relatively large percentage of the emissions from natural gas plants is from equipment with process streams with relatively low percentages of VOC (but greater than 1.0 weight percent). The costs of controlling equipment with VOC concentrations greater than 1.0 weight percent are reasonable, with one exception, and, therefore, they are covered by the proposed standards. The exception is reciprocating compressors in wet gas service that are located at a natural gas plant that does not have a control device at the plant site. As discussed in the *Selection of the Basis for the Proposed Standards* section of this preamble, these compressors are not subject to the compressor control requirements.

Equipment covered by standards of performance for facilities within the synthetic organic chemical manufacturing industry and within petroleum refinery process units are excluded from these proposed standards. Equipment covered by national emission standards for benzene are also excluded.

Control Techniques and Control Costs for Equipment Leaks of VOC

There are basically two types of control techniques available for equipment leaks of VOC: (1) leak detection and repair programs; and (2) equipments, design, and operational requirements. Leak detection and repair programs reduce equipment leaks of VOC by establishing a procedure which includes monitoring to detect VOC leaks from specific equipment and steps to repair leaking equipment. Both types of control techniques apply to pressure relief devices, valves, and pumps. Equipment, design, and operational requirements were considered for compressors, open-ended valves or lines, and sampling connection systems. The control techniques considered for each type of equipment are summarized below and are described more fully in Chapter 4 of the BID. In addition, costs and VOC emission reductions associated with each control technique are presented below.

Pressure relief devices. Equipment leaks of VOC from pressure relief devices result from leakage of process materials through the pressure relief device valve seat. VOC emissions can be controlled by a leak detection and repair program or by installation of a rupture disk between the process stream and pressure relief device.

The annual costs and VOC emission reductions achieved for monthy and quarterly leak detection and repair programs and for use of control equipment (rupture disks) were determined for pressure relief devices. A quarterly leak detection and repair program results in a net annual credit of $610, reducing VOC emissions by approximately 950 kilograms per year (kg/yr). The cost of a monthly leak detection and repair program is completely offset by the recovery credits, and VOC emissions would be reduced by about 1 megagram per year (Mg/yr). Installation of rupture disks would control an additional 500 kg/yr but at the relatively high cost of $6,700/Mg. The control costs per megagram of VOC reduced and the emission reductions achieved are presented in Table 1.

TABLE 1.—CONTROL COSTS PER MEGAGRAM OF VOC'S REDUCED [a]

Fugitive emission source	Control technique [b]	Emission reduction,[c] Mg/yr	Average,[d] $/Mg	Incremental,[e] $/Mg
Pressure relief devices	*Quarterly leak detection and repair* [g]	0.95	([f])	([f])
	Monthly leak detection and repair	1.0	0	5,800
	Rupture disks	1.5	6,800	22,000
Compressors	*Closed vent and seal system* [g]	[h]14	460	460
Open-ended valves and lines	*Caps on open ends* [g]	19	([f])	([f])
Sampling connection systems	Closed purge sampling	[i]0.22	[i]7,000	[i]7,000
Valves	Quarterly leak detection and repair	40	([f])	([f])
	Monthly leak detection and repair [g]	43	0	[j]1,400
Pumps	Quarterly leak detection and repair	2.0	590	590
	Monthly leak detection and repair [g]	2.3	610	800
	Dual mechanical seal systems	2.6	4,900	31,000

[a] Costs and emission reductions are based on Model Plant B as presented in the BID, Appendix H.
[b] Further discussion of control techniques used can be found in Chapters 4 and 6 of the BID.
[c] Emission reductions are for Model Plant B. Refer to BID Table 7-2.
[d] Average dollars per megagram (cost effectiveness) = net annual cost per component ÷ annual VOC emission reduction per component.
[e] Incremental dollars per megagram = (net annual cost of the control technique − net annual cost of the next less restrictive control technique) ÷ (annual emission reduction of control technique − annual emission reduction of the next less restrictive control technique).
[f] Cost savings occur.
[g] Control techniques selected as the basis for the proposed standards.
[h] Emission reduction for compressors is from BID Appendix H, Table 3.
[i] Costs and emission reduction for closed purge sampling represent both inlet gas sampling and product liquids sampling.
[j] Monthly/quarterly leak detection and repair is allowed under the proposed standards and the incremental cost effectiveness of monthly/quarterly from quarterly leak detection and repair is less than 300 $/Mg.

Compressors. Many types of seals and packings are used to limit leakage of process gases around compressor drive shafts. VOC can be emitted as a result of seal design, seal deterioration, or imperfections. VOC also can be emitted from barrier fluid degassing vents that are used on some types of mechanical seals on centrifugal compressors. Reciprocating compressors are supplied with vented seals and enclosed and vented distance pieces. Emissions from these vents can be collected and routed to either a process heater, the compressor intake, or a flare. The distance piece enclosures would be slightly pressurized with a barrier fluid (such as product gas) to prevent an explosive atmosphere in the enclosure.

The annual costs and emission reductions were estimated for the use of a closed vent system for reciprocating compressor seals and for the use of mechanical seals and barrier fluid systems for centrifugal compressor seals. The control cost per megagram of VOC reduced would be $460. These numbers are presented in Table 1.

Open-Ended Valves or Lines and Sampling Connection Systems. Equipment leaks of VOC from open-ended valves or lines result from leakage of process fluids through the valve seat. These emissions can be controlled by the installation of a cap or a second valve. A net annual credit of $1,900 would result from installation of caps on open-ended lines or valves. This would result in an emission reduction of approximately 19 megagrams of VOC per year.

Open-ended valves or lines can be used for sampling process fluids, which may result in equipment leaks of VOC. These emissions can be reduced through the use of closed purge sampling systems. Closed purge sampling would result in an average annual cost of $7,000 per megagram of VOC and would reduce VOC emissions by 0.22 megagrams per year. The control costs per megagram of VOC reduced and the emission reductions achieved are presented in Table 1.

Valves. Equipment leaks of VOC result when valve packings or O-rings that are used to limit leakage of process fluids around valve stems deteriorate. VOC emissions from valves can be reduced through leak detection and repair programs.

The annual costs per megagram of VOC emissions reduced and emission reductions achieved were determined for leak detection and repair programs. These costs and emission reductions are presented in Table 1. Quarterly monitoring for leaks from valves results in net annual savings of about $4,000, and the cost of monthly monitoring is completely offset by the recovery credits. Quarterly monitoring would reduce VOC emissions by 40 megagrams per year, and monthly monitoring would reduce VOC emissions by 43 megagrams per year. The incremental cost per megagram of monthly monitoring compared to quarterly monitoring is $1,400 per year.

Pumps. Equipment leaks of VOC result from leakage of process fluids around pump drive shafts and through deteriorated seal packings or worn mechanical seal faces. VOC can also be emitted from the barrier fluid degassing vents used on some types of dual mechanical seal systems. VOC emissions from pump seals can be reduced through leak detection and repair programs or through the use of dual mechanical seals with controlled degassing vents.

The control costs incurred for each megagram of VOC emissions reduced and emission reductions achieved were determined for leak detection and repair programs and the use of dual mechanical seals with controlled degassing vents. These costs and emission reductions are presented in Table 1. Quarterly monitoring and monthly monitoring result in costs of $590 and $610 per megagram of VOC controlled and reduce annual VOC emissions by 2.0 and 2.3 megagrams, respectively. Dual mechanical seals would result in a cost of $4,900 per megagram of VOC and would reduce annual VOC emissions by 2.6 megagrams. The incremental cost per megagram of monthly monitoring is $800 per megagram of VOC (in comparison with quarterly monitoring), and the incremental cost per megagram of dual mechanical seals is $31,000 per megagram of VOC (in comparison with monthly monitoring).

Selection of the Basis for the Proposed Standards

Section 111 of the Clean Air Act, as amended, requires that standards of performance be based on the best system of continuous emission reduction that has been adequately demonstrated, considering costs, nonair quality health and environmental impact, and energy requirements (best demonstrated technology). As a first step toward determining which control techniques should be selected as the basis for the proposed standards, EPA analyzed the annual cost of controlling VOC emissions and the resultant VOC reduction for each alternative control technique. EPA also considered the nonair environmental, energy, and economic impacts associated with selecting alternative control techniques as the basis for the proposed standards.

The control costs per megagram of VOC reduced are presented in Table 1. These costs do not represent the actual amounts of money spent at any particular plant site. The cost of VOC emission reduction systems will vary according to the products being produced, production equipment, plant layout, geographic location, and company preferences and policies. However, these costs are considered typical of control techniques for equipment leaking VOC within natural gas plants and can be used in making decisions about the level of control to be required.

The analysis presented in Table 1 shows that the incremental control costs per megagram of VOC reduced were $31,000 for dual mechanical seals with controlled degassing vents compared to a leak detection and repair program with monthly monitoring. For pressure relief devices, the incremental costs per megagram were $22,000 for rupture disks compared to a leak detection and repair program with monthly monitoring and $5,800 for monthly monitoring compared to quarterly monitoring. The cost per megagram of VOC reduced was $7,000 for closed purge sampling systems. These costs were judged to be unreasonably high, and, therefore, these specific control options were given no further consideration.

EPA next examined the costs and emission reductions associated with a leak detection and repair program with monthly monitoring for valves and pumps, quarterly monitoring for pressure relief devices, and the use of equipment on open-ended valves or lines, and compressors. Incremental costs per megagram of VOC reduced for these control technologies range from a credit to a cost of about $1,400 for the typical size plant. As discussed later in this preamble, the monthly leak detection and repair requirement for valves has provisions that allow monthly/quarterly monitoring. Allowing monthly/quarterly monitoring reduces the incremental costs per megagram of VOC to a maximum of about $800. These costs are judged to be reasonable for a typical size plant, considering the potential emission reduction to be achieved.

EPA recognizes, however, that there are some relatively small plants that operate without technically trained personnel being present because of the type of process that is performed there. While fractionating plants require the presence of technically trained personnel, small nonfractionating plants often operate unmanned or without personnel having the technical ability necessary to carry out responsibly a leak detection and repair program. In these cases, central office personnel or an outside consultant would be required to conduct leak detection and repair. The additional costs that would be incurred in such cases were examined and considered in light of the emission reduction that would be achieved (Appendix F of the BID). The costs were judged to change from reasonable to unreasonable at plants having capacities between 142,000 and 283,000 scmd (5 and 10 million scfd). Therefore, EPA decided to exempt any nonfractionating plant whose capacity is 283,000 scmd (10 million scfd) or less of field gas from the routine monitoring requirements for valves, pumps, and pressure relief devices. However, all fractionating plants, regardless of capacity, would be required to implement the routine monitoring requirements.

The costs and the cost effectiveness numbers stated in Table 1 are based on an average size plant (2.55 million scmd, or 90 million scfd) with 50 percent reciprocating compressors and 50 percent centrifugal compressors. One industry representative stated that some small plants do not have a control device and that the additional costs associated with the installation and operation of a control device would make the reciprocating compressor control cost effectiveness unreasonable for such small facilities. The costs, including the additional costs of installing and operating a control device (a flare), were analyzed for various compressor types (reciprocating and centrifugal) in different types of VOC service (wet gas and natural gas liquids). The costs and cost effectiveness were reasonable for all combinations of compressor type and type VOC service except the reciprocating compressor in wet gas service (less than 50 weight percent VOC). The cost effectiveness for this combination was judged to be unreasonable. Therefore, the Administrator decided to exempt from the compressor control requirements reciprocating compressors in wet gas service that are located at a gas plant that does not have a control device present at the plant site.

To ensure that the analyses leading to the small plant-size exemption and to the reciprocating wet gas compressor exemption adequately considered all relevant factors, the Agency requests comments from interested parties about the recommended exemptions.

Natural gas plants are relatively large emitters of VOC, with equipment leaks comprising a significant VOC emitting segment in natural gas plants. The control techniques, for which the incremental costs per megagram emission reduction were judged to be reasonable, would result in a nationwide reduction of at least 18,800 Mg of VOC in the fifth year after proposal. It is reasonable to believe that a reduction of this size in VOC emissions from the gas production industry would be of significant benefit to the environment. After considering the results of the analysis of the control costs per megagram reduced by these control techniques, EPA tentatively selected them as the basis for the proposed standards.

Next, economic, energy, and nonair quality environmental impacts were examined to determine if they would alter the selection of the basis for the proposed standards. The economic impact analysis shows that the control techniques, for which it was decided that the costs per megagram of VOC reduced are reasonable, would result in no adverse economic impacts on the affected industry and would result in an increase in the consumer price of natural gas of no more than 0.1 percent. EPA also examined the nonair quality environmental and energy impacts of the control techniques considered for each source. Analyses of these impacts are presented in Chapter 7 of the BID. Reduction in VOC leakage, resulting from any of the control options considered, would reduce the waste load on wastewater treatment systems, thereby having a positive impact on water quality. Solid waste impacts due to any of the control options would be minimal. Each control option would result in a net positive energy impact due to conservation of VOC which has an energy value. Since there were no adverse nonair quality environmental or energy impacts, consideration of these impacts did not affect the decision on the basis of the proposed standards.

In summary, the most effective control techniques which were considered by EPA to have reasonable incremental costs per megagram of VOC emissions reduced were selected as the basis for the proposed standards. These control techniques include a monthly leak detection and repair program for valves and pumps and a quarterly leak detection and repair program for pressure relief devices at all onshore natural gas plants except those that both do not fractionate natural gas liquids and that have a capacity of 283,000 scmd (10 million scfd) or less. Control equipment was selected as the basis for the proposed standards for open-end valves or lines and for compressors. Less restrictive control techniques were not considered further because they achieved less emission reduction; and there were no cost, economic, energy, or nonair quality environmental impacts which necessitated further examination of these control techniques.

Selection of Format for the Proposed Standards

Several formats could be used to implement the control requirements selected as the basis for the proposed standards. Section 111 of the Clean Air Act requires that a standard of performance be prescribed unless, in the judgment of the Administrator, it is not feasible to prescribe or enforce such a standard. Section 111(h) defines two conditions under which it is not feasible to prescribe or enforce a performance standard. These conditions are (1) if the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations, or (2) if the pollutants cannot be emitted through a conveyance device. If a performance standard is not feasible to prescribe or enforce, then the Administrator may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof.

A performance standard allows for some flexibility because any control technique may be used if it achieves the level of emission reduction represented by the standard. However, for most equipment leaks of VOC it is not feasible to prescribe a performance standard. Except in those cases in which standards can be set at "no detectable emissions," the only way to measure emissions from equipment leaking VOC would be to use a bagging technique for each piece of equipment. The great number of pieces of equipment and their distribution over large areas would make such a requirement economically impracticable for many plants.

Another approach for prescribing a performance standard would be to specify a number or percent of equipment that would be allowed to leak. The only equipment for which a leak frequency limit would be applicable is valves, because other pieces of equipment are too few in number to allow a meaningful percent to be determined. The variability in the percentage of leaking valves among process units precludes setting an allowable percentage of leaking valves that could necessarily be achieved by all process units within the industry. Therefore, establishing an allowable percentage of leaking valves applicable to all process units is not practicable. However, establishing an allowable percentage of leaking valves based on cost considerations associated with levels of performance is possible. If a process unit achieves the designated level of performance, then the owner or operator may elect to comply with an alternative standard for valves. This approach, which would add flexibility to the proposed standards, is discussed in more detail in the *Alternative Standards for Valves* section of this preamble.

Based on EPA's determination that it is infeasible to prescribe a performance standard for most equipment leaks of VOC at onshore natural gas plants, the alternative regulatory formats identified in Section 111(h) of the Act were considered. One possible format is an equipment standard. Equipment standards provide well-documented emission reductions. Determining compliance would require an initial check to ensure that the equipment had been installed properly and periodic checks to ensure that the equipment was continuing to operate properly. An inherent disadvantage associated with this type of format is less site-specific flexibility.

As indicated in the next section of this preamble, EPA reviewed the performance of equipment other than the equipment selected as the basis for the proposed standards and is proposing to allow other equipment as alternatives to the equipment and work practices required by the proposed standards. These alternatives are allowed if they provide a reduction in emissions that is at least equivalent to the reductions achieved by the equipment or work practices required by the proposed standards. In addition, owners and operators of affected facilities would have additional flexibility because they could obtain EPA's approval to employ other equivalent techniques under Section 111(h)(3) and innovative techniques under the waiver provisions of Section 111(j).

Other formats include work practice, design, and operation standards. An example of the work practice format would be a program for leak detection and repair. Inspection methods, inspection time intervals, and time allowed for repair would be defined in detailing the work practices. Compliance with a work practice standard would be demonstrated by documenting that the work practices have been carried out. Rather than requiring specific control equipment or work practices, a design or operational format would require that a certain design representative of a level of control be attained or that certain conditions during operation of a process be achieved. For example, combustion devices may be required to be designed to achieve a specified level of control efficiency.

The proposed standards incorporate all of the possible formats. Different formats are required for different types of leaking equipment because characteristics of the equipment, the available emission control techniques, and the applicability of the measurement method used for equipment leaks differ. In the next section, the rationale for selecting a particular format is explained for each type of leaking equipment. For each type of leaking equipment, the feasibility of prescribing or enforcing a performance standard is discussed. If a performance standard is not feasible, the rationale for selecting another format is presented.

Selection of Emission Limit, Equipment, Work Practice, Design and Operational Standards

Compressors. The basis of the proposed standards for compressors is a closed-vent system to control leakage from the seal vent and distance piece area. Emission limits for compressors have not been proposed because the application of available measurement methods would not be practicable because of technological or economic limitations. Thus, EPA proposes that the compressor be equipped with a seal area enclosure and closed vent system to carry the VOC emissions to a control device. The enclosure would capture all the emissions from the seal area. The closed vent system and control device would be required to comply with requirements discussed in the *Closed Vent Systems and Control Devices* portion of this section of the preamble.

For centrifugal compressors, mechanical seals with a barrier fluid system would be an equivalent alternative to a vent control system because they would achieve essentially 100 percent control of VOC emissions. In these instances, requirements must also be established to ensure the proper operation and maintenance of the equipment. A pressure or level indicator on the barrier fluid system would reveal any catastrophic failure of the seal or of the barrier fluid system. This indicator could be monitored in the control room or be equipped with an alarm to signal a failure of the system. Thus, a requirement to include an indicator to detect failure of the system is proposed, pursuant to Section 111(h), to ensure the proper operation and maintenance of the alternative mechanical seal system.

As mentioned in the *Selection of Affected Facilities* section of this preamble, there may be some cases in which distance pieces cannot be enclosed or seals with barrier fluid systems cannot be utilized with a closed vent system to a control device because some existing compressors cannot technologically or economically be retrofitted. For example, enclosing the distance piece and venting to a control device could require replacement of the distance piece on a reciprocating compressor or replacement of an entire reciprocating compressor. In these situations, determination of whether installation of the enclosure and venting system or its equivalent is technologically or economically feasible can take place during the determination of whether an existing compressor will be considered reconstructed and therefore affected by the standards. If EPA determines that an existing compressor cannot be technologically or economically retrofitted, then the compressor would not be required to comply with the standards.

Open-Ended Valves or Lines. The basis of the proposed standards is equipment that would enclose the open end. Bagging of this equipment for emission measurement or other techniques for measuring leak rates would not be economically or technologically practicable. A "no detectable emissions" standard could not be selected as the format for the proposed standard because VOC could leak through the valve seat and become trapped in the line between the valve and the cap. The trapped VOC could be emitted to the atmosphere, even though the VOC emitted to the atmosphere would be much less than the VOC emitted without the enclosure. Thus, EPA selected the use of an equipment standard for control of equipment leaks of VOC from open-ended valves or lines.

Enclosure of the open end can be achieved by installing a cap, plug, or a second valve. The control efficiency associated with these techniques is approximately 100 percent, except when the line is used for draining, venting, or sampling operations. Thus, EPA is proposing standards that require open-ended valves or lines to be equipped with a cap, plug, or a second valve. If a second valve is used, the proposed standards require that the upstream valve be closed first, pursuant to Section 111(h). After the upstream valve is completely closed, the downstream valve must be closed. This operational requirement is necessary in order to prevent trapping process fluid between the two valves, which could result in a situation equivalent to the uncontrolled open-ended valve or line.

Valves. Valves could not reasonably be designed to release fugitive emissions to a conveyance, and bagging or other means of emission rate measurement is not reasonable. As discussed in the *Selection of Format for the Proposed Standards* section of this preamble, and allowable percentage of valves leaking cannot be selected as the basis for the proposed standard because of process unit variability. Similarly, a "no detectable emissions" limit cannot be prescribed, because, with the control techniques selected as the basis for the proposed standards, valves will still occasionally leak. Therefore, work practices consisting of periodic leak detection and repair programs were selected as the basis for the proposed standards for valves.

Several factors influence the level of emission reduction that can be achieved by a leak detection and repair program. The three main factors are the monitoring interval, leak definition, and repair interval. Training and diligence of personnel conducting the program, the adequacy of repair methods attempted, and other site-specific factors may also influence the level of emission reduction achievable; however, these factors are less quantifiable. The overall emission reduction of a leak detection and repair program depends on the three main factors. Each of these three factors limits the effectiveness of the program. For example, if each of the factors selected for a leak detection and repair program represents a 90 percent effectiveness, then the overall effectiveness would be about 73 percent. Thus, the most effective definition that is reasonable for each factor should be selected.

The "monitoring interval" is the frequency at which individual equipment inspections are conducted. In selecting the basis of the proposed standards, EPA considered two regulatory alternatives for valves—monitoring at monthly intervals and monitoring at quarterly intervals. The incremental cost of monthly versus quarterly monitoring was judged to be reasonable for the additional emission reduction achieved by monthly valve monitoring. Consequently, monthly monitoring was selected as the basis of the standard. This judgment was based on emission reductions and costs calculated at the rate at which valve leaks typically occur at a gas plant.

However, EPA recognizes that some valves have lower leak occurrence rates than others. Monthly monitoring of valves that do not leak for 2 consecutive months was judged to be unreasonable when compared to the additional emission reduction achieved by monthly monitoring over quarterly monitoring. Therefore, although EPA is proposing that leak detection and repair programs include monthly monitoring for valves, the standard would allow quarterly monitoring for valves that have been found not leaking for 2 successive months.

Some valves are difficult to monitor because access to the valves is restricted. Difficult-to-monitor valves can be eliminated in new facilities but cannot be eliminated in existing facilities. Therefore, for facilities that become affected by a modification or reconstruction, EPA is proposing an annual leak detection and repair program for valves which are difficult to monitor. Valves which are difficult to monitor are defined as valves which would require elevating the monitoring personnel more than two meters above any readily available support surface. For new affected facilities, all valves would be subject to the proposed monthly leak detection and repair program.

The "leak definition" is the instrument reading observed during monitoring that would be used to determine which components have failed and need to be repaired. The best leak definition would be the one that achieved the most emission reduction at reasonable costs. The emission reduction achieved would increase at the leak definition decreased, due to the increasing number of components that would be found leaking and, therefore, repaired. At a leak definition of 10,000 ppm, approximately 90 percent of VOC leaks from valves would be detected. It is well documented that valves that have been found leaking at levels of 10,000 ppm or greater can be brought to levels below 10,000 ppm with proper maintenance. Also, as a practical matter, most commonly available hydrocarbon detectors that are considered intrinsically safe have a maximum reading of 10,000 ppm. Leak definitions higher than 10,000 ppm could, nevertheless, be selected (and dilution probes could be used with portable detectors); however, there would be less emission reduction with the 10,000 ppm definition and no substantial associated cost savings. Consequently, there is no basis for selecting a leak definition greater than 10,000 ppm. A leak definition lower than 10,000 ppm may be practicable in the sense that leaks can be repaired to levels less than 10,000 ppm. However, EPA is unable to conclude that a leak definition lower than 10,000 ppm would provide additional emission reductions and, therefore, would be reasonable. Because the 10,000 ppm leak definition would address approximately 90 percent of the VOC leaks from valves at reasonable costs and at reasonable cost effectiveness, and because safe, available hydrocarbon detectors can read 10,000 ppm, the 10,000 ppm level was selected as the leak definition for valves. This definition was also considered appropriate for pumps and pressure relief devices. The same portable monitor used for valves would be used for these types of equipment, and consideration of other relevant factors did not indicate that the 10,000 ppm definition should be different for pumps or pressure relief devices.

The "repair interval" is the length of time allowed between the detection of a leaking piece of equipment and its subsequent repair. To provide the maximum effectiveness of the leak detection and repair program, the repair interval selected should require expeditious reduction of emissions but allow the owner or operator sufficient time to maintain flexibility in the overall maintenance schedule of the gas plant.

The length of the repair interval would affect emission reductions achievable by the leak detection and repair program because leaking equipment would be allowed to continue to leak for a given length of time. Repair intervals of 5 and 15 days were evaluated. The effect on the emission reduction potential is proportional to the number of days the equipment is allowed to leak between detection and repair.

An initial attempt at repair of a leaking piece of equipment should be accomplished as soon as practicable after detection of the leak. Most repairs can be done quickly. A 5-day period provides sufficient time to schedule simple field repair. Attempting to repair the leak within 5 days will help maintenance personnel to identify the leaks that cannot be repaired with simple field repair or without shutdown of the affected facility.

Valves that are not repairable by simple field repair may require removal from the process for repair. Even repair intervals of 5 and 10 days could cause scheduling problems in repairing these valves. A 15-day interval provides time for isolating pieces of leaking equipment when equipment isolation is needed for repair beyond simple field repairs. A 15-day interval provides the owner or operator with sufficient time for determining precisely which spare parts are needed and provides sufficient time for flexibility in scheduling repair for these valves. In addition, a 15-day interval provides time for better determination of methods for isolating pieces of leaking equipment when equipment isolation is needed for repair beyond simple field repairs.

In general, a 5-day repair interval provides sufficient time to schedule simple field repair. A 15-day repair interval allows more efficient handling of more complex repair tasks while maintaining an effective reduction in equipment leaks. A repair interval of 30 or 45 days provides less effective reduction in emissions and does not substantially affect the ability to handle repair tasks. Thus, the proposed standards require an initial attempt to repair a leaking valve within 5 days and complete repair, except as discussed below, within 15 days.

Delay of repair beyond 15 days would be allowed for leaks that could not be repaired without shutting down an affected facility. In general, these leaks would have to be repaired at the next scheduled facility shutdown. Spare parts for valves can usually be stocked such that all leaks that could not be repaired without shutting down the affected facility could be repaired during the shutdown. Spare parts include packing gland bolts and valve packing material. In a few instances, replacement of the entire valve assembly would be required. EPA is proposing to allow delay of repair beyond an affected facility shutdown for valves which require replacement of the entire valve assembly, provided the owner or operator can demonstrate that sufficient stock of spare valve assemblies had been maintained before the stock had been depleted.

Alternative Standards for Valves. The emission reduction and annual cost of the proposed leak detection and repair program depend in part on the number of leaking valves that are detected during monitoring. If very few valve leaks are detected in an affected facility, then the amount of VOC that could be reduced by the proposed program for valves is much smaller than the amount that could be reduced in a facility having more leaks. Additionally, the annual cost of the leak detection and repair program would be larger for an affected facility with fewer leaks than in an affected facility with more leaks, because the annual cost includes a recovery credit based on the amount of VOC reduced by the program. Thus, the annual cost per megagram of VOC emission reduction for the proposed leak detection and repair program varies with the number of valves which leak within an affected facility.

For example, a monthly leak detection and repair program for valves in VOC service, assuming 18 percent of valves leaking initially, results in zero net annual cost and achieves an annual VOC emission reduction of 43 Mg for a typical process unit. In contrast, for a typical process unit with 2.0 percent of the valves leaking on the average, a monthly leak detection and repair program results in an annual cost of about $7,000 and achieves an annual emission reduction of 5.2 Mg. For a typical process unit with 0.5 percent of the valves leaking on the average, a monthly leak detection and repair program results in an annual cost of $7,400 and achieves an annual emission reduction of about 1.5 Mg. As explained previously, although the standard is based on monthly monitoring, it actually allows monthly/quarterly monitoring, which reduces the costs.

There is no precise breakpoint in the annual cost and emission reduction relationship. However, EPA judges that the emission reduction and annual cost relationship is unreasonably high for process units that over an extended period have fewer than 1.0 percent of valves leaking. Based on this judgment, an allowable percent of valves leaking was determining that reflects the long-term average of 1.0 percent of valves leaking, as discussed below.

Due to the variability inherent in valve leak detection, a process unit that averages less than 1.0 percent of valves leaking will have, at times, more than 1.0 percent of valves leaking. The variability in valve leak detection can be characterized as a binomial distribution. Provision for the variability in leak detection is accomplished by straightforward statistical techniques based on the binomial distribution. An allowable percent of valves leaking of 2.0 percent, to be achieved at any point in time, would provide an owner or operator a risk of about 5 percent that greater than 2.0 percent of valves would be determined leaking when the average of 1.0 percent was actually being achieved. Based on these considerations, EPA considers an allowable percent of valves leaking of 2.0 percent to represent an average of 1.0 percent of valves leaking.

EPA is proposing two alternative standards which would exempt valves within process units from the required (monthly/quarterly monitoring) leak detection and repair program. Owners or operators of affected facilities may identify and elect to achieve either of the alternative standards. The alternative standards would allow owners or operators to tailor leak control programs to their own operations. An owner or operator would report which alternative standard he had identified and elected to achieve.

The first alternative standard would limit the maximum percent of valves leaking within an affected facility to 2.0 percent. As previously pointed out in the *Selection of Format for the Proposed Standards* section of this preamble, an industry-wide performance standard which could reasonably be achieved at all facilities was not possible for valves. This was due to the variability in valve leak frequency and variability in the ability of a leak detection and repair program to reduce these leaks among all affected facilities within the industry. However, this alternative standard would allow any affected facility the option of complying with an allowable percent of valves leaking for a particular affected facility. Choosing this alternative standard would allow for the possibility or different leak detection and repair programs and substitution of engineering controls (e.g., valves designed to leak less frequently) at the discretion of the owner or operator. This alternative standard would also eliminate a large part of the recordkeeping associated with the monthly/quarterly leak detection and repair program for valves.

Performance tests, as specified in 40 CFR 60.8(f), require three runs. However, three runs for performance tests to determine the percent of valves leaking are unnecessary and would be inconsistent with the performance standard, which is based on leak frequency at any time. Thus, performance tests for valves complying with the percent leak frequency alternative are exempt from § 60.8(f) in the proposed standards; a performance test will consist of only one run. However, this alternative standard would require a minimum of one performance test per year. Additional performance tests could be requested by EPA. If the results of a performance test showed that greater than 2.0 percent of the valves leak, the owner or operator would be in violation of the proposed standards.

In certain circumstances, an owner or operator may want to request a waiver of future tests as provided in the General Provisions of 40 CFR Part 60. This would provide flexibility for owners and operators of onshore natural gas processing plants where, for whatever reason, routine leak detection and repair is not needed to effectively control emissions. This would include gas plants that use superior equipment or that simply do not leak for unexplained reasons. Based on performance tests that demonstrate the achievability of the 2.0 percent standard and information that indicates that this standard would be achieved on a continuing basis, EPA could waiver the annual performance tests.

The second alternative standard would allow the use of skip-period leak detection for valves. Under skip-period leak detection, an owner or operator could skip from routine leak detection for valves to less frequent leak detection. This skip-period leak detection program would require that a performance level of 2.0 percent be achieved on a continuous basis with more than 90 percent certainty. An owner or operator would choose one of two skip-period leak detection programs for valves and then implement that one program. The first skip-period leak detection program could be used when fewer than 2.0 percent of the valves had been leaking for two consecutive quarterly leak detection periods. The first skip-period leak detection program would allow an owner or operator to skip every other quarterly leak detection period; that is, leak detection can be performed semi-annually. Under the second skip-period leak detection program, if fewer than 2.0 percent of the valves had been leaking for five consecutive quarterly leak detection periods, the owner or operator may skip three quarterly leak detection periods; that is, leak detection can be performed annually. When more than 2.0 percent of valves are found to leak, monthly/quarterly leak detection would be required to be resumed.

Pumps. As with some of the previously discussed equipment, pumps are generally not designed to leak VOC emissions to a conveyance. Because of the difficulty of routinely bagging pumps, bagging of this equipment for emission measurement would not be economically or technologically practicable. Even though leaking pumps can be detected, the small number of pumps within process units does not allow the establishment of a performance standard. A "no detectable emissions" limit cannot be prescribed because, with the control technique selected as the basis for the proposed standards, pumps can still leak.

In the analysis for the basis for the proposed standards, EPA selected a work practice consisting of periodic leak detection and repair program for pumps. As with valves, the effectiveness of the leak detection and repair program for pumps is limited by the selection of the monitoring interval, leak definition, and repair interval. The same leak definition and repair interval selected for valves were selected for pumps for the reasons discussed previously. Monthly monitoring was selected as the monitoring interval for pumps based on cost considerations, as discussed in the *Selection of the Basis for the Proposed Standards* section of this preamble. One month provides the most effective leak detection and repair program for pumps without imposing difficulties or unreasonable cost in implementing the program.

Several types of pumps with ancillary equipment can achieve emission reductions of VOC at least equivalent to that achieved by the monthly leak detection and repair program for pumps. These include dual mechanical seal systems that utilize a barrier fluid between the seals, enclosure of the pump seal area, and sealless pumps. If the barrier fluid in a dual seal system is maintained at a pressure greater than the pump stuffing box pressure, any leakage between the seals would be from the barrier fluid to the process fluid, so no process fluid would be emitted to the atmosphere. If the pump stuffing box pressure is greater than the barrier fluid pressure (for example, tandem seals), the barrier fluid collects the leakage from the inner seal. The process fluid collected by the barrier fluid is controlled by either (1) connecting the barrier fluid degassing system to a control device with a closed vent systems, or (2) by returning the barrier fluid to the process stream.

Because these dual mechanical seal systems are at least equivalent to a monthly leak detection and repair program for pumps, owners or operators may elect to use dual mechanical seals rather than implement the monthly monitoring program.

Section 111(h) of the Clean Air Act requires that when equipment standards, such a dual mechanical seal requirements, are established, requirements must also be established to assure the proper operation and maintenance of the equipment. As stated previously for mechanical seals in compressors, a pressure or level indicator on the barrier fluid system would reveal any catastrophic failure of the inner or outer seal, or of the barrier fluid system. This indicator could be monitored in the control room or equipped with an alarm to signal a failure of the system. Thus, EPA is proposing requirements to assure the proper operation and maintenance of the dual mechanical seal system.

Sealless pumps, such as diaphragm or canned pumps, do not have a potential leak area and, therefore, are at least equivalent to monthly leak detection and repair and dual seal systems. As with other leakless equipment, the proposed standard requires an initial performance test, using the procedures specified in Reference Method 21, to verify that the piece of leakless equipment meets the "no detectable emissions" limit and annual rechecks to ensure continued operation with "no detectable emissions." An instrument reading of less tha 500 parts per million by volume (ppm) above a background concentration based on Reference Method 21 can be used to indicate whether VOC leaks have been eliminated, that is, that the equipment has "no detectable emissions."

In many cases, the seal area of a pump could be completely enclosed, and this enclosed area could be connected with a closed vent system to a control device. The control efficiency of this arrangement is dependent on the control efficiency of the combustion or vapor recovery system. The closed vent system could require a flow-inducing device to transport emissions from the seal area to the control device. Some owners or operators may decide that this approach is preferable to leak detection and repair. Enclosing the seal area and venting the captured emissions to a control device by means of a closed vent system is a reasonable alternative because this system would be at least as effective as a monthly leak detection and repair program. Therefore, the EPA is proposing to allow pumps to be equipped with enclosed seal areas that are connected to a control device by a closed vent system in accordance with the requirements for these systems discussed below in the *Closed Vent System and Control Device* portion of this section.

Pressure relief devices. Pressure relief devices could not reasonably be designed to leak VOC emissions to a conveyance, and bagging or other means of emission rate measurement is not reasonable. A performance standard that prescribes an allowable percentage of pressure relief devices leaking is infeasible due to process unit variability. A "no detectable emissions" limit would be possible only if the standard were based on the use of rupture discs; this control technology was rejected as the basis for the standard for cost reasons.

Work practices consisting of periodic leak detection and repair programs were selected as the basis for the proposed standard for pressure relief devices. For reasons discussed previously, the leak definition selected for pressure relief devices is 10,000 ppm, and the repair interval selected is 15 days. Quarterly monitoring was selected as the monitoring interval for pressure relief devices based on incremental cost considerations, as discussed in the *Selection of the Basis for the Proposed Standards* section of this preamble. Quarterly monitoring provides the most effective leak detection and repair program for pressure relief devices without imposing unreasonable costs in implementing the program. In addition, pressure relief devices would be required to be monitored within 5 days after each overpressure to determine if a leak has occurred as a result of the overpressure.

In addition to the quarterly leak detection and repair program, EPA considered the use of rupture discs or closed vent systems with control device as equivalent alternatives. When the integrity of rupture discs is maintained, equipment leaks of VOC through the relief device are eliminated. Rupture discs maintain their integrity unless an overpressure occurs. After the occurrence of an overpressure, replacement of the rupture disc once again eliminates equipment leaks of VOC through the pressure relief device.

For control techniques that eliminate equipment leaks, such as the use of rupture discs, a "no detectable emissions" limit is feasible. An instrument reading of less than 500 parts per million by volume (ppm) above a background concentration based on Reference Method 21 can be used to indicate whether equipment leaks have been eliminated, that is, that the equipment has "no detectable emissions."

The alternative "no detectable emission" limit would not apply to discharges through the pressure relief device during overpressure relief because the function of relief devices is to discharge process fluid, thereby reducing dangerous high pressures within the equipment. The standard would specify, however, that the relief device be returned to a state of "no detectable emissions" within 5 days after such a discharge. The standard would further require an annual test to verify the "no detectable emissions" status of the pressure relief devices.

If a closed vent system is not open to the atmosphere, and the control device complies with the requirements discussed in the *Closed Vent Systems and Control Devices* portion of this section of the preamble, then its reduction in VOC emissions would be at least equivalent to the reduction achieved with the quarterly leak detection and repair program. Based on these considerations, EPA is proposing to allow rupture discs or closed vent systems with control devices as equivalent alternatives to the quarterly leak detection and repair program for pressure relief devices.

Closed Vent Systems and Control Devices. Control devices would be used to reduce VOC captured and transported through closed vent systems. These control devices, which are present for purposes unrelated to this proposed standard, would be designed to dispose of organic vapor streams from other sources in the plant. Because the streams from the closed vent systems will usually be low-flow or intermittent in comparison to streams from other sources, emissions in closed vent streams will often contribute a very small and varying portion of the total organic vapor stream going to the control device. Measurement techniques that reflect the effectiveness of these control devices to reduce equipment leaks of VOC are limited. Because these techniques would require costly material balancing of the VOC entering the control devices, it is not economically practicable to measure the emissions from these control devices. For this reason an emission standard is not proposed for control devices used to reduce VOC that are captured and transported by closed vent systems.

Control devices were selected as part of the best technological system of emission reduction for some equipment leaks of VOC (such as compressors) and are part of alternative approaches to achieving compliance with the standards for other equipment (such as pumps). These control devices would already be in place in most existing gas plants and, therefore, would not be designed solely to reduce equipment leaks of VOC. These existing control devices provide varying degrees of emission reduction; therefore, selecting standards of performance for these devices may not reflect the emission reduction capability of the best control devices nor the capability of devices specifically designed for control of equipment leaks of VOC.

Flares are presently used in gas plants mainly as a means of handling emergency releases from various processes within the gas plant. According to the current knowledge of flare design, the best available flare design or state-of-the-art flare design is the smokeless flare. Smoking flares are environmentally less desirable because they emit particulates.

There are a number of techniques currently in use within industry which help flares achieve smokeless operation. One technique involves the use of staged elevated flare systems, where a small diameter flare is operated in tandem with a large diameter flare. The system is designed such that the small flare takes the continuous low flow releases and the larger flare accepts emergency releases. A second technique involves the use of a small, separate conveyance line to the flare tip in order to maintain a high exit velocity for the continuous low flow, low pressure gas flow. A third technique, sometimes used in conjunction with either of the above techniques, involves the use of continuous flare gas recovery. In the third technique, a compressor is used to recover the continuously generated flare gas "base load." The compressor is sized to handle the "base load," and any excess gas is flared. These techniques can be used to help provide smokeless operation of a flare which is used to reduce fugitive emissions of VOC that are captured and transported by closed vent systems.

In recent tests, smokeless steam-assisted flares, smokeless air-assisted flares, and smokeless flares with no assist were found to be as efficient as enclosed combustion devices in destroying VOC over a broad range of operating conditions if the heat content of the flared gas is maintained above a certain minimum, and the velocity of the gas at the flare tip is maintained below a certain maximum. Based on the test data and a comparison of vent stream characteristics between the test data and equipment leaking VOC, EPA believes that the destruction efficiency of smokeless flares used in natural gas processing plants would be at least 98 percent.

Enclosed combustion devices can be designed and operated to achieve VOC emission reductions of at least 98 percent. Vapor recovery systems can be readily designed and operated to achieve VOC emission reductions of at least 95 percent. Existing enclosed combustion devices and vapor recovery systems may not achieve the VOC emission reduction efficiencies that new control devices achieve. However, existing control devices achieve a VOC reduction efficiency of at least 95 percent.

EPA selected a VOC reduction efficiency of 95 percent for control devices used to reduce equipment leaks of VOC. EPA considers the use of enclosed combustion devices and flares achieving 98 percent emission reduction too costly to add to a process unit solely to control VOC leaks in light of the presence of existing control devices that can achieve 95 percent control. Thus, because EPA believes that flares with no assist, steam, or air assist in onshore natural gas plants can achieve at least 98 percent VOC reduction efficiency if designed for smokeless operation and that existing control devices, such as enclosed combustion devices and vapor recovery systems, will achieve at least 95 percent VOC reduction efficiency, EPA selected a VOC reduction efficiency of 95 percent.

EPA selected design and operational requirements for flares, enclosed combustion devices, and vapor recovery systems that reflect application of the best technological system of emission reduction for control devices used to reduce equipment leaks of VOC. The design and operation requirements for flares, discussed above, require smokeless operation and the presence of a flame. The presence of a flame can be ensured by monitoring the flare's pilot light with a thermocouple or some other heat sensor connected to an alarm. Smokeless operation of the flare is ensured through visible emission requirements. The proposed standards would limit visible emissions from a flare to less than 5 minutes in any 2-hour period. Many natural gas plants currently comply with State limits similar to this requirement. In addition, only steam-assisted flares, air-assisted flares, or flares with no assist could be used. Steam-assisted flares would have to be operated with exit velocities less than 18 m/sec (60 ft/sec), under standard conditions, combusting gases with heating values of 11.2 MJ/scm (300 Btu/scf) or greater. Air-assisted flares would have to be operated with heating values of 11.2 MJ/scm (300 Btu/scf) or greater and with exit velocities equal to, or less than, that velocity determined by the equation specified in the regulation. The actual velocity would be calculated by dividing the gas flow (in standard units), as determined by the methods specified in the regulation, by the unobstructed (free) cross section area of the flare tip. Flares operated without assist would have to be operated with exit velocities less than 18 m/sec (60 ft/sec), under standard conditions, combusting gases with heating values of 7.4 MJ/scm (200 Btu/scf) or greater. Because enclosed combustion devices and vapor recovery systems exist that provide at least 95 percent emission reduction, a 95 percent emission reduction design requirement is proposed for these control devices. For enclosed combustion devices that do not use catalysts to aid in combustion of organic vapor streams, provisions for a minimum vapor residence time of 0.75 seconds at a minimum temperature of 816° C will be considered equivalent to at least a 95 percent emission reduction efficiency.

Miscellaneous. Pumps and valves in heavy liquid service, pressure relief devices in light liquid and heavy liquid service, and flanges and other connectors in all services would be excluded from the routine monitoring and inspection requirements on the basis of data from EPA testing. However, if leaks are detected from this equipment, the same allowable repair interval which applies to pumps, pressure relief devices, and valves would apply.

Individual flanges in process units have very low emission rates; and although they represent 76 percent of the total number of equipment leaking VOC in gas plants, their total contribution to overall emissions is about 14 percent. In EPA testing of equipment leaking VOC in refineries, pumps and valves in heavy liquid service, and pressure relief devices in light liquid and heavy liquid VOC service also exhibited very low emission rates. This equipment contributes less than 1 percent of all emissions from refineries. EPA did not test pumps and valves in heavy liquid service and pressure relief devices in light liquid and heavy liquid service at gas plants. However, it is reasonable to conclude that these sources would contribute a very low percentage of all emissions at gas plants as well as at refineries. Including pumps and valves in heavy liquid service, pressure relief devices in light liquid and heavy liquid service, and flanges and other connectors in all services in the monitoring and equipment requirements would result in an unreasonably high cost per megagram. Consequently, these equipment are excluded from those requirements.

Also excluded would be equipment operating under a vacuum because leaks to the atmosphere would not occur while the equipment is operated at subatmospheric internal pressures.

Selection of Recordkeeping and Reporting Requirements

Recordkeeping would be required by the proposed standards to provide documentation for the assessment of compliance with (1) work practice standards, (2) equipment standards, (3) design standards, (4) emission standards, and (5) operational standards. Review of records would provide information for enforcement personnel to assess implementation of the proposed standards. Compliance with the proposed standards would be determined by inspection and review of records.

Three recordkeeping alternatives were considered in evaluating the amount of recorded information needed to assess compliance with the proposed standards. The first alternative would be to require no formal recordkeeping. If recorded documentation of the proposed standards were not required, no mechanism would be provided for checking the thoroughness of efforts to reduce VOC leaks. Many owners or operators would institute recordkeeping requirements to manage the efforts of their plant personnel. However, some owners or operators might not institute such programs, and owners who would institute them might not know what information would be pertinent to enforcement of the standards.

The second alternative would require recordkeeping to document results of the leak detection and repair program and information relating to equipment specifications. Information would be recorded in sufficient detail to enable owners or operators to ensure that their emission reduction programs are being implemented effectively and to demonstrate compliance with the proposed standards. This alternative would require the maintenance of quantitative records of repaired and unrepaired leaking equipment. This alternative would require only that amount of records necessary to manage implementation of the required programs (and certain alternative valve programs, if selected) and to ensure the effective implementation of the proposed standards.

The third alternative would require recordkeeping of all the information generated by the proposed standards. This information would include, for example, the meter reading (ppm) detected for all components monitored at a given facility. Much of this information would be necessary for managing implementation of the required programs or for ensuring the effective implementation and maintenance of the proposed standards.

The second alternative was selected as the basis for the recordkeeping requirements of the proposed standards. This alternative would provide the necessary records for managing implementation of the required programs while ensuring effective implementation and maintenance of the proposed standards.

Specific information pertaining to the leak detection and repair would be recorded. Each valve found to be leaking during the first month of a quarter would be identified with a readily visible weatherproof identification. Each pump found to be leaking during a monthly monitoring would also be identified. The identifications could be a tag attached to the valve or pump or a number designation permanently marked on the valve or pump. The identification could be removed after a valve is repaired and found not to leak for the next 2 successive months. The identification also could be removed after a pump is repaired.

A log would be maintained to record the efforts by an owner or operator pertaining to the leak detection and repair program. The log would contain the instrument and operator identification numbers, the leaking equipment identification number, the date of detection of the leaking equipment, the date of the first attempt to repair the leaking equipment, repair methods applied to repair the equipment, and the date of final repair. The log would be kept for 2 years following the survey. If the leaking equipment could not be repaired within 15 days, the reasons for unsuccessful repair and the date of anticipated successful repair would be recorded on the leak report form. Once the leaking equipment was successfully repaired, the date of repair would be recorded. These records would be needed to provide the information necessary to allow the owner or operator to evaluate the effectiveness of repair efforts and to allow enforcement personnel to assess compliance with the work practice standards. If the owner or operator elects to implement the alternative standard for valves that allows skip-period leak detection, he or she must also record the percentage of valves found leaking during each leak detection period.

For equipment specifications, records would be maintained of the dates of installation, start-up, equipment repair, and equipment modifications. The dates and descriptions of any control equipment failures would also be recorded. These records would be needed to provide information necessary to allow enforcement personnel to assess the effectiveness of implementation and maintenance of equipment standards.

For design standards, records would be maintained of the location and type of equipment to which the standards apply. As an example, if a combustion source is used as a VOC emission control device, then the design fuel and air usage rates, the firebox volume, and the average firebox temperature and other design specifications would be recorded.

Reporting requirements were also considered for the proposed standards. Three alternatives were considered in evaluating the reporting information needed to assess compliance with the proposed stands. These alternatives represent varying levels of enforcement monitoring of the proposed standards. Enforcement personnel would review the reports submitted by industry personnel on the status of implementing the proposed standards. Review of reports reduces the need for in-plant inspections.

The first alternative would require no formal reporting of compliance with the proposed standards other than notifications of construction, anticipated startup and actual startup, and an intention to comply with one of the alternative standards discussed in this preamble. This alternative would not provide a mechanism for routinely verifying industry's efforts to reduce equipment leaks of VOC. Thus, compliance with the proposed standards would be assessed through in-plant inspections.

The second reporting alternative would require the submittal of information in sufficient detail to ensure the implementation and maintenance of the proposed standards. These requirements would stipulate the submittal of semiannual reports. Included in the reports would be a summary of information on the leaking equipment that had been detected during the 6-month period. The semiannual reports would contain summary data of the number of leaks found, the number not repaired within 15 days, and the reasons for nonrepair. This requirement would provide enforcement personnel with an overview of the repair of leaking equipment.

The third reporting alternative would require the submittal of all the information obtained while conducting leak detection and repair programs. This information would include the information reported in the second alternative and, additionally, comprehensive information on all tested equipment. This reporting alternative would necessitate the reporting of all information included in the recordkeeping requirements and, therefore, would require more resources than the second alternative.

The second alternative was selected as the reporting requirement for the proposed standards. This alternative provides sufficient information to assess implementation of the work practice requirements without requiring excessive resources from industry and enforcement personnel (e.g., reduces the need for in-plant inspections). The first alternatives was not selected because implementation of work practice standards could not be assessed adequately by enforcement personnel to ensure that reductions in emissions from leaking equipment were achieved. The third reporting alternative was not selected because the additional resources expended by industry would not facilitate assessment of compliance enough to warrant the increased expense.

In addition to the requirements for semiannual reports, the reporting requirements of the General Provisions and the reporting of the intention to comply with an alternative standard for valves would apply. The requirements for semiannual reports are waived as to affected sources in States where the program has been delegated if EPA, in the course of delegation, approves reporting requirements or an alternative means of source surveillance adopted by the State. Such sources would be required to comply with the requirements adopted by the State.

The Paperwork Reduction Act of 1980 (Pub. L. 96–511) requires clearance from the Office of Management and Budget (OMB) of reporting and recordkeeping requirements that qualify as an "information collection request" (ICR). For the purposes of OMB's review, an analysis of the burden associated with the reporting and recordkeeping requirements of this regulation has been made. During the first 2 years of this regulation, the average annual burden of the reporting and recordkeeping requirements would be about 6.6 person-years, based on an average of 44 respondents per year.

Equivalent Means of Emission Limitation

Under the provisions of Section 111(h) of the Clean Air Act, if the Administrator establishes work practices, equipment, design or operational standards, then the Administrator must allow the use of equivalent means of emission limitations if they achieve a reduction in air pollutants equivalent to that achieved under requirements of a standard of performance. Sufficient data would be required to show equivalency, and opportunity for a public hearing would be required.

Individual owners or operators could request equivalent means of emission limitation for specific requirements, such as the proposed equipment requirements and the proposed leak detection and repair program. Sufficient information would have to be collected by a facility to demonstrate that the control techniques would be equivalent to the control techniques required by the proposed standards. This information would then be submitted to EPA in a request for a determination of equivalence. If the Administrator believes that an equivalency request may be approved, a notice to announce the opportunity for a public hearing would be published in the **Federal Register**. After public notice and opportunity for public hearing, the Administrator would determine equivalence and would publish that determination in the **Federal Register**.

Public Hearing

There will be an opportunity for a public hearing to discuss these proposed standards in accordance with Section 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations should contact EPA at the address given in the **ADDRESSES** section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement before, during, or within 30 days after the hearing. Written statements should be addressed to the Central Docket Section address given in the **ADDRESSES** section of this preamble and should refer to Docket Number A-80-20-B.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at EPA's Central Docket Section in Washington, D.C. (see **ADDRESSES** section of this preamble).

Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered by EPA in the development of this proposed rulemaking. The principal purposes of the docket are: (1) to allow members of the public and industries involved to identify and locate documents so they can effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review, except for interagency review material (section 307(d)(7)(A)).

Miscellaneous

As prescribed by Section 111 of the Clean Air Act, establishment of standards of performance for the onshore crude oil and natural gas production industry was preceded by the Administrator's determination (40 CFR 60.16, amended at 47 FR 951, dated January 8, 1982) that this industry contributes significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. In accordance with Section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. EPA welcomes comments on all aspects of the proposed regulations, including economic and technological issues.

This regulation will be reviewed 4 years from the date of promulgation. This review will include an assessment of such factors as the need for integration with other programs, the existence of alternative methods, enforceability, improvements in emission control technology, and the reporting requirements.

The reporting and recordkeeping (information collection) provisions associated with the proposed standards (40 CFR 60.7, 60.8, 60.636 and 60.637) will be submitted for approval to the Office of Management and Budget (OMB) under Section 3504(h) of the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* The final rule will explain how the reporting and recordkeeping requirements respond to any OMB or public comments.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any new source standard of performance promulgated under Section 111(b) of the Act. An economic impact assessment was prepared for the proposed regulations and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the proposed standards to insure that the proposed standards would represent the best system of emission reduction considering costs. The economic impact assessment is included in the background information document.

"Major Rule" Determination. Under Executive Order 12291, the Administrator is required to judge whether a regulation is a "major rule" and, therefore, is subject to certain requirements of the Order. The Administrator has determined that this regulation would result in none of the adverse economic effects set forth in Section 1 of the Order as ground for finding a regulation to be "major rule." Fifth-year net annual costs (after accounting for recovery credits) of the proposed standards would be as much as $2.5 million for the 220 newly constructed, modified, and reconstructed production facilities projected that could be affected by the standards during the first 5 years. Price increases from implementation of these proposed standards would be less than 0.1 percent. This is because the annualized cost is a small fraction of the yearly revenue expected for the new, modified, and reconstructed units affected during the 5-year period. The Administrator has also concluded that this rule is not "major" under any of the criteria established in the Executive Order.

As discussed in the *Selection of the Basis of the Proposed Standards* section of this preamble, EPA considered annual costs in relation to the extent of VOC emission reduction achieved during selection of the proposed standards. The annual cost per megagram of VOC emission reduction is summarized in Table 1 for a new, intermediate-size natural gas plant that would be affected by the proposed standards. The incremental differences between the annual costs per megagram of VOC emission reductions under the proposed standards and the next less restrictive level of control are also summarized in Table 1.

This regulation was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMB to EPA and any EPA responses to those comments are available for public inspection in Docket Number A-80-20-B, Central Docket Section, at the address given in the **ADDRESSES** section of this preamble.

Regulatory Flexibility Analysis Certification. The Regulatory Flexibility Act of 1980 requires that adverse effects of all Federal regulations upon small businesses be identified. Current criteria stipulate that a regulatory flexibility analysis must be prepared if 20 percent of the small businesses would suffer "significant impacts." According to current Small Business Administration guidelines, a small business in the gas production industry is one that has 500 employees or less. It is unlikely that any onshore natural gas plant that would be subject to these proposed standards would qualify as a small business. Even if there were any plants that would qualify as small businesses, none would suffer significant impacts. This conclusion is based on the fact, in doing the economic analysis for this proposal, the price increase and profitability impacts have been estimated from the perspective of the smaller facilities in operation. Therefore, the finding that the annual cost of the proposed standards would be less than 0.1 percent of the yearly revenue expected for plants affected by the proposed standards, accurately reflects the impacts for small natural gas plants.

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this rule will not have a significant economic impact on a substantial number of small entities.

List of Subjects in 40 CFR Part 60

Air pollution control, Aluminum, Ammonium sulfate plants, Asphalt, Cement industry, Coal, Copper, Electric power plants, Glass and glass products, Grains, Intergovernmental relations, Iron, Lead, Metals, Metallic minerals, Motor vehicles, Nitric acid plants, Paper and paper products industry, Petroleum, Phosphate, Sewage disposal, Steel Sulfuric acid plants, Waste treatment and disposal, Zinc, Tires, Incorporation by reference, Can surface coating, Sulfuric acid plants, Industrial organic chemicals, Organic solvent cleaners, Fossil fuel-fired steam generators.

Dated: January 11, 1984.

William D. Ruckelshaus,

Administrator.

PART 60—[AMENDED]

It is proposed that 40 CFR Part 60 be amended by adding a new subpart as follows:

Subpart KKK—Standards of Performance for Onshore Natural Gas Processing Plants: Equipment Leaks of VOC

Sec.

Authority: Sec. 111 and 301(a) of the Clean Air Act, as amended, (42 U.S.C. 7411, 7601(a)), and additional authority as noted below.

Subpart KKK—Standards of Performance for Onshore Natural Gas Processing Plants: Equipment Leaks of VOC

§ 60.630 Applicability and designation of affected facility.

(a)(1) The provisions of this subpart apply to affected facilities in onshore natural gas processing plants.

(2) A compressor in VOC service is an affected facility.

(3) The group of all equipment within a process unit is an affected facility.

(b) Any affected facility under paragraph (a) of this section that commences construction or modification after January 20, 1984 would be subject to the requirements of this subpart.

(c) Addition of replacement of equipment for the purpose of process improvement that is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

(d)(1) Affected facilities covered by Subpart VV or Subpart GGG of 40 CFR Part 60 are excluded from this subpart.

(2) If the equipment is subject to the provisions of this subpart and 40 CFR Part 61 Subpart J, the equipment will only be required to comply with the provisions of 40 CFR Part 61 Subpart J.

(e) The provisions of this subpart do not apply to compressor stations, dehydration units, sweetening units, underground storage facilities, field gas gathering systems, and liquefied natural gas units unless the facility is located at an onshore natural gas processing plant.

§ 60.631 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act or in Subpart A of Part 60, and the following terms shall have the specific meanings given them:

"Closed-vent system" means a system that is not open to the atmosphere and that is composed of piping, connections, and, if necessary, flow-inducing devices that transport gas or vapor from a compressor or from a piece (or pieces) of equipment to a control device.

"Connector" means flanged, screwed, welded, or other joined fittings used to connect two pipe lines or a pipe line and a piece of process equipment.

"Control device" means an enclosed combustion device, vapor recovery system, or flare.

"Distance piece" means an open or enclosed casing through which the piston rod travels, separating the compressor cylinder from the crankcase.

"Equipment" means each pump, pressure relief device, open-ended valve or line, valve, and flange or other connector that is in VOC service and any device or system required by this subpart.

"Field gas" means feedstock gas entering the natural gas plant.

"First attempt at repair" means to take rapid action for the purpose of stopping or reducing leakage of organic material to atmosphere using best practices.

"In gas/vapor service" means that the compressor or the piece of equipment contains fluid that is in the gaseous state at operating conditions.

"In heavy liquid service" means that the piece of equipment is not in gas/vapor service or in liquid service.

"In light liquid service" means that the piece of equipment contains a liquid that meets the conditions specified in § 60.635(e).

"Natural gas liquids" means the hydrocarbons, such as ethane, propane, butane, and pentane, that are extracted from field gas.

"Natural gas processing plant" (gas plant) means any processing site engaged in the separation of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.

"Onshore" means situated on land as opposed to over sea water.

"Open-ended valve or line" means any valve, except pressure relief valves, having one side of the valve seat in contact with process fluid and one side that can be open to the atmosphere, either directly or through open piping.

"Pressure release" means the emission of materials from processes resulting from the system pressure being greater than the set pressure of the pressure relief device.

"Process improvement" means routine changes made for safety and occupational health requirements, for energy savings, for better utility, for ease of maintenance and operation, for correction of design deficiencies, for bottleneck removal, for changing product requirements, or for environmental control.

"Process unit" means equipment assembled for the separation of natural gas liquids from field gas, the fractionation of the liquids into natural gas products, or other operations associated with the processing of natural gas products. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the products.

"Process unit shutdown" means a work practice or operational procedure that stops production from a process unit or part of a process unit. The use of spare equipment and technically feasible bypassing of equipment without stopping production are not process unit shutdowns.

"Quarter" means a 3-month period; the first quarter concludes on the last day of the last full month during the 180 days following initial startup.

"Reciprocating compressor" means a piece of equipment that increases the pressure of a process gas by positive displacement, employing linear movement of the driveshaft.

"Repaired" means that equipment is adjusted, or otherwise altered, to eliminate a leak as indicated by one of the following: an instrument reading of 10,000 ppm or greater, indication of liquids dripping, or indication by a sensor that a seal or barrier fluid system has failed.

"Sensor" means a device that measures a physical quantity or the change in a physical quantity, such as temperature, pressure, flow rate, pH, or liquid level.

"In vacuum service" means that equipment is operating at an internal pressure that is at least 5 kilopascals (kPa) below ambient pressure.

"In VOC service" means that the piece of equipment or the compressor contains or contacts a process fluid that is at least 1.0 percent VOC by weight. (The provisions of § 60.635(e) specify how to determine that a piece of equipment is not in VOC service.)

"In wet gas service" means that a compressor contains or contacts a process fluid that is less than 50 percent VOC by weight.

§ 60.632-1 Standards: General.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the requirements of § 60.632-1 to § 60.632-9 for affected facilities within 180 days of initial startup.

(b) Compliance with § 60.632-1 to § 60.632-9 will be determined by review of records and reports, review of performance test results, and inspection using the methods and procedures specified in § 60.635.

(c)(1) An owner or operator may request determination of equivalent means of emission limitation to the requirements of § 60.632-2, -3, -4, -5, -6, -7, and -9 as provided in §60.634.

(2) If the Administrator makes a determination that a means of emission limitation is at least equivalent to the requirements of § 60.632-2, -3, -4, -5, -6, -7, or -9, an owner or operator shall comply with the requirements of that determination.

(d) Equipment in vacuum service may be excluded from the requirements of § 60.632-2 to § 60.632-9 if they are identified as required in § 60.636(e)(3).

(e) Pumps in light of liquid service, valves in gas/vapor and light liquid service, and pressure relief devices in gas/vapor service that are located at an onshore natural gas processing plant that does not fractionate natural gas liquids and that does not have the design capacity to process 283,000 standard cubic meters per day (scmd) (10 million standard cubic feet per day (scfd)) or more of field gas are exempt from the routine monitoring requirements of § 60.632-2(a)(1), 60.632-4(a), and 60,632-6(a).

(f) Reciprocating compressors in wet gas service that are located at an onshore natural gas processing plant that does not have a control device present at the plant site are exempt from the compressor control requirements of § 60.632-3.

§ 60.632-2 Standards: Pumps in light liquid service.

(a)(1) Each pump seal in light liquid service shall be monitored monthly to detect leaks by the methods specified in § 60.635(b), except as provided in § 60.632-1(c) and paragraphs (d), (e), and (f) of this section.

(2) Each pump shall be checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seal.

(b)(1) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(2) If there are indications of liquids dripping from the pump seal, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected except as provided in § 60.632-8.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) Each pump equipped with a dual mechanical seal system that includes a barrier fluid system is exempt from the requirements of paragraph (a), provided the following requirements are met:

(1) Each dual mechanical seal system is:

(i) Operated with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure; or

(ii) Equipped with a barrier fluid degassing reservoir that is connected by a closed-vent system to a control device that complies with the requirements of § 60.632-9; or

(iii) Equipped with a closed vent system that purges the barrier fluid into a process stream with zero VOC emissions to the atmosphere.

(2) The barrier fluid system is in heavy liquid service or is not in VOC service.

(3) Each barrier fluid system is equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both.

(4) Each pump is checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seal.

(5)(i) Each sensor as described in paragraph (d)(3) is checked daily or is equipped with an audible alarm, and

(ii) The owner or operator determines, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(6)(i) If there are indications of liquid dripping from the pump seal or the sensor indicates failure of the seal system, the barrier fluid system, or both, based on the criterion determined in paragraph (d)(5)(ii), a leak is detected.

(ii) When a leak is detected, it shall be required as soon as practicable, but not later than 15 calendar days after it is detected except as provided in § 60.632-8.

(iii) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) Any pump that is designated, as described in § 60.636(e)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraphs (a), (c), and (d) if the pump:

(1) Has no externally actuated shaft penetrating the pump housing,

(2) Is operated with no detectable VOC emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in § 60.635(c), and

(3) Is tested for compliance with paragraph (e)(2) initially upon designation, annually, and at other times requested by the Administrator.

(f) If any pump is equipped with a closed-vent system capable of capturing and transporting any leakage from the seal or seals to a control device that complies with the requirements of § 60.632-9, it is exempt from paragraphs(a) though (e).

§ 60.632-3 Standards: Compressors.

(a) Each compressor shall be equipped with a closed-vent system capable of capturing and transporting any leakage from the seal vent and the distance piece area to a control device as described in § 60.632-9, except as provided in § 60.632-1(c) and paragraphs (b) though (i) of this section.

(b) Any compressor that is not equipped as described in paragraph (a) shall be equipped with a seal system that includes a barrier fluid system and that prevents leakage of VOC to the atmosphere.

(c) Each compressor seal system as required in paragraph (b) shall be:

(1) Operated with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure; or

(2) Equipped with a barrier fluid system that is connected by a closed-vent system to a control device that complies with the requirements of § 60.632-9; or

(3) Equipped with a system that purges the barrier fluid into a process stream with zero VOC emissions to the atmosphere.

(d) The barrier fluid system shall be in heavy liquid service or shall not be in VOC service.

(e) Each barrier fluid system as described in paragraph (b) of this section shall be equipped with a sensor that will detect failure of the seal system, barrier fluid system, or both.

(f)(1) Each sensor as required in paragraph (e) shall be checked daily or shall be equipped with an audible alarm.

(2) The owner or operator shall determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(g) If the sensor indicates failure of the seal system, the barrier fluid system, or both, based on the criterion determined under paragraph (f)(2) of this section a leak is detected.

(h)(1) When a leak is detected, it shall be repaired as soon as practicable but no later than 15 calendar days after it is detected except as provided in § 60.632-8.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(i) Any compressor that is designed, as described in § 60.632(e)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraph (a) through (h) of this section if the compressor:

(1) Is operated with no detectable emissions, as indicated by an instrument reading less than 500 ppm above background, as measured by the methods specified in § 60.635(c); and

(2) Is tested for compliance with paragraph (i)(1) initially upon designation, annually, and at other times requested by the Administrator.

§ 60.632-4 Standards: Pressure relief devices in gas/vapor service.

(a) Each pressure relief device shall be monitored quarterly and within 5 days after each pressure release to detect leaks by the methods specified in § 60.635-(b) except as provided in § 60.632-1(c).

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after it is detected, except as provided in § 60.632-8.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) Any pressure relief device that is designated, as described in § 60.636-(e)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraphs (a), (b), and (c) of this section if the pressure relief device:

(1) Is operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, except during pressure releases, as measured by the method specified in § 60.635(c);

(2) After each pressure release, the pressure relief device shall be returned to a condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as soon as practicable, but no later than 5 calendar days after the pressure release, except as provided in § 60.632-8; and

(3) Is tested for compliance initially, after each pressure release, annually, and at other times requested by the Administrator.

(e) Any pressure relief device that is equipped with a closed-vent system capable of capturing and transporting all leakge from the pressure relief device to a control device that complies with the requirements of § 60.632-9 is exempt from paragraphs (a) through (d) of this section.

§ 60.632-5 Standards: Open-ended valves or lines.

(a)(1) Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or a second closed valve, except as provided in § 60.632-1(c).

(2) The cap, blind flange, plug, or second closed valve shall seal the open end at all times except during sampling and other operations requiring process fluid flow through the open-ended valve or line.

(b) Each open-ended valve or line equipped with a second valve shall be operated in a manner such that the valve on the process fluid end is closed before the second valve is closed.

§ 60.632-6 Standards: Valves in gas/vapor and light liquid service.

(a) Each valve in gas/vapor and light liquid service shall be monitored monthly to detect leaks by the methods specified in § 60.635(b) and shall comply with paragraphs (b) through (e) of this section, except as provided in paragraphs (f) and (g) of this section, § 60.633-1 and -2, and § 60.632-1(c).

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) Any valve for which a leak is not detected for 2 successive months may be monitored the first month of every quarter, beginning with the next quarter, until a leak is detected.

(2) If a leak is detected, the valve shall be monitored monthly until a leak is not detected for 2 successive months.

(d)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after the leak is detected, except as provided in § 60.632-8.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) First attempts at repair include, but are not limited to, the following best practices where practicable:

(1) Tightening of bonnet bolts.

(2) Replacement of bonnet bolts.

(3) Tightening of packing gland nuts.

(4) Injection of lubricant into lubricated packing.

(f) Any valve that is designated, as described in § 60.636(e)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraph(a) if the valve:

(1) Has no external actuating mechanism in contact with the process fluid.

(2) Is operated with emissions less than 500 ppm above background, as measured by the method specified in § 60.635(c), and

(3) Is tested for compliance initially upon designation, annually, and at other times requested by the Administrator.

(g) Any valve that is designated, as required in § 60.636(f)(2), as a difficult-to-monitor valve is exempt from the requirements of paragraph(a) if:

(1) The owner or operator of the valve demonstrates that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.

(2) The process unit within which the valve is located becomes an affected facility through § 60.14 or § 60.15, and

(3) The owner or operator of the valve has a written plan that requires monitoring of the valve at least once per calendar year.

§ 60.632-7 Standards: Pumps and valves in heavy liquid service, pressure relief devices in light liquid and in heavy liquid service, and flanges and other connectors.

(a) Pumps and valves in heavy liquid service, pressure relief devices in light liquid and in heavy liquid service, and flanges and other connectors shall be monitored within 5 days, by the method specified in § 60.635(b), after evidence of a potential leak is found by visual, audible, olfactory, or other detection method.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after it is detected, except as provided in § 60.632-8.

(2) The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) First attempts at repair include, but are not limited to, the best practices described under § 60.632-6(e).

§ 60.632-8 Standards: Delay of repair.

(a) Delay of repair of compressors and equipment for which leaks have been detected will be allowed if the repair is technically infeasible without a process unit shutdown. Repair of this equipment shall occur, however, at the first process unit showdown.

(b) Delay of repair beyond a process unit shutdown will be allowed for a valve if valve assembly replacement is necessary during the process unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the next process unit shutdown will not be allowed unless the next process unit shutdown occurs sooner than 6 months after the first process unit shutdown.

§ 60.632-9 Standards: Closed-vent systems and control devices.

(a) Owners or operators of closed-vent systems and control devices used to comply with provisions of this subpart shall comply with the provisions of this section.

(b) Vapor recovery systems (for example, condensers and adsorbers) shall be designed and operated to recover the VOC emissions vented to them with an efficiency of 95 percent or greater.

(c) Enclosed combustion devices shall be designed and operated to reduce the VOC emissions vented to them with an efficiency of 95 percent or greater or to provide a minimum residence time of 0.75 seconds at a minimum temperature of 816°C.

(d)(1) Flares shall be designed for and operated with no visible emissions, as determined by the method in § 60.635(g), except for periods not to exceed a total of 5 minutes during any period of 2 consecutive hours.

(2) Flares shall be operated with a flame present at all times, as determined by the method specified in § 60.635(g).

(3) Flares shall be used only with the net heating value of the gas being combusted being 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted being 7.45 MJ/scm or greater if the flare is non-assisted. The net heating value of the gas being combusted shall be determined by the methods specified in § 60.635(g).

(4) Steam-assisted and non-assisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in § 60.635(g)(4), less than 18 m/sec (60 ft/sec).

(5) Air-assisted flares shall be designed and operated with an exit velocity less than the velocity, V_{max}, as determined by the methods specified in § 60.635(g)(5).

(6) Flares used to comply with this subpart shall be steam-assisted, air-assisted, or non-assisted.

(e) Owners or operators of control devices used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their design.

(f)(1) Closed-vent systems shall be designed and operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background and by visual inspections, as determined by the method specified in § 60.635(c).

(2) Closed-vent systems shall be monitored to determine compliance with this section initially in accordance with § 60.8, annually, and at other times requested by the Administrator.

(g) Closed-vent systems and control devices used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

§ 60.633-1 Alternative standards for valves—allowable percentage of valves leaking.

(a) An owner or operator may elect to comply with an allowable percentage of valves leaking, which is equal to or less than 2.0 percent.

(b) The following requirements shall be met if an owner or operator wishes to comply with an allowable percentage of valves leaking:

(1) An owner or operator must notify the Administrator that the owner or operator has elected to comply with the allowable percentage of valves leaking before implementing this alternative standard, as specified in § 60.637(a).

(2) A performance test as specified in paragraph (c) of this section shall be conducted initially upon designation, annually, and at other times requested by the Administrator.

(3) If a valve leak is detected, it shall be repaired in accordance with § 60.632-6 (d) and (e).

(c) Performance tests shall be conducted in the following manner:

(1) All valves in gas/vapor and light liquid service within the affected facility shall be monitored within a 1 week period by the methods specified in § 60.635(b).

(2) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(3) The leak percentage shall be determined, and recorded, by dividing the number of valves for which leaks are detected by the number of valves in gas/vapor and light liquid service within the affected facility.

(d) Owners and operators who elect to comply with this alternative standard shall not have an affected facility with a leak percentage greater than 2.0 percent.

(e) If an owner or operator no longer wishes to comply with § 60.633-1, the owner or operator must notify the Administrator in writing that the work practice standard described in § 60.632-6 (a) through (e) will be followed.

§ 60.633-2 Alternative standards for valves—skip period leak detection and repair.

(a)(1) An owner or operator may elect to comply with one of the alternative work practices specified in paragraph (b) of this section.

(2) An owner or operator must notify the Administrator before implementing one of the alternative work practices, as specified in § 60.637(a).

(b)(1)(i) An owner or operator shall comply with a reference leak detection program.

(ii) The reference leak detection program shall conform to the requirements for valves in gas/vapor service and valves in light liquid service, as described in § 60.632-6.

(2) After 2 consecutive quarterly leak detection periods with the percent valves leaking equal to or less than 2.0, an owner or operator may begin to skip 1 of the quarterly leak detection periods.

(3) After 5 consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, an owner or operator may begin to skip 3 of the quarterly leak detection periods.

(4) If the percent of valves leaking is greater than 2.0, the owner or operator shall comply with the reference leak detection program, as described in § 60.632-6, but can again elect to use paragraphs (b)(2) or (b)(3) of this section.

(5) An owner or operator must keep a record of the percent of valves found leaking during each leak detection period.

§ 60.634 Equivalent means of emission limitation.

(a) Each owner or operator subject to the provisions of this subpart may apply to the Administrator for determination of equivalence for any means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to the reduction in emissions of VOC achieved by the controls required in this subpart.

(b) Determination of equivalence to the equipment, design, and operational requirements of this subpart will be evaluated by the following guidelines:

(1) Each owner or operator applying for an equivalence determination shall be responsible for collecting and verifying test data to demonstrate

equivalence of any means of emission limitation.

(2) The Administrator will compare test data for the equivalent means of emission limitation to test data for the equipment, design, and operational requirements.

(3) The Administrator may condition the approval of equivalence or requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the equipment, design, and operational requirements.

(c) Determination of equivalence to the required work practices in this subpart will be evaluated by the following guidelines:

(1) Each owner or operator applying for a determination of equivalence shall be responsible for collecting and verifying test data to demonstrate equivalence of any means of emission limitation.

(2) For each affected facility for which a determination of equivalence is requested, the emission reduction achieved by the required work practice shall be demonstrated for a minimum period of 12 months.

(3) For each affected facility, the emission reduction achieved by the equivalent means of emission limitation shall be demonstrated.

(4) Each owner or operator applying for a determination of equivalence shall commit to compliance with a performance that provides for emission reductions equal to or greater than the emission reductions achieved by the required work practice.

(5) The Administrator will compare the demonstrated emission reduction for the equivalent means of emission limitation to the demonstrated emission reduction for the required work practice and will consider the commitment in paragraph (c)(4) of this section.

(6) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the required work practice.

(d) An owner or operator may offer a unique approach to demonstrate the equivalence of any means of emission limitation.

(e)(1) After a request for determination of equivalence is received, the Administrator will publish a notice in the **Federal Register** and provide the opportunity for a public hearing if the Administrator judges that the request may be approved.

(2) After notice and opportunity for a public hearing, the Administrator will determine the equivalence of any means of emission limitation and will publish the determination in the **Federal Register**.

(3) Any equivalent means of emission limitation approved under this section shall constitute a required work practice, equipment, design, or operational standard within the meaning of Section 111(h)(1) of the Clean Air Act.

(f)(1) Manufacturers of equipment used to control equipment leaks of VOC may apply to the Administrator for determination of equivalence for any means of emission limitation that achieves a reduction in emissions of VOC achieved by the equipment, design, and operational requirements of this subpart.

(2) The Administrator will make an equivalence determination according to the provisions of paragraphs (b), (c), (d), and (e) of this seciton.

§ 60.635 Test methods and procedures.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the test method and procedure requirements provided in this section.

(b) Monitoring, as required in § 60.632, § 60.633, and § 60.634, shall comply with the following requirements:

(1) Monitoring shall comply with Reference Method 21.

(2) The detection instrument shall meet the performance criteria of Reference Method 21.

(3) The instrument shall be calibrated before use on each day of its use by the methods specified in Method 21.

(4) Calibration gases shall be:

(i) Zero air (less than 3 ppm of hydrocarbon in air); and

(ii) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.

(5) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(c) When compressors or equipment are tested for compliance with no detectable emissions as required in § 60.632–2(e), –3(i), –4(d), –6(f), and –9(f), the test shall comply with the following requirements:

(1) The requirements of paragraphs (b)(1) through (5) of this section shall apply.

(2) The background level shall be determined, as set forth in Reference Method 21.

(3) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(4) The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 ppm for determining compliance.

(d)(1) Equipment is in heavy liquid service if the weight percent evaporated is 10 percent or less at 150°C as determined by ASTM Method (incorporated by reference as specified in § 60.17).

(2) Equipment is in light liquid service if the weight percent evaporated is greater than 10 percent at 150°C as determined by ASTM Method D–86 (incorporated by reference as specified in § 60.17).

(e)(1) Each piece of equipment within a process unit is presumed to be in VOC service unless an owner or operator demonstrates that the piece of equipment is not in VOC service. For a piece of equipment to be considered not in VOC service, it must be determined that the percent VOC content can be reasonably expected never to exceed 1.0 percent by weight. For a compressor to be considered in wet gas service, it must be determined that the percent VOC content is less than 50.0 percent by weight. For purposes of determining the percent VOC content of the process fluid that is contained in or contacts a compresor or equipment, procedures that conform to the methods described in ASTM Method E–260, E–168, or E–169 (incorporated by reference as specified in § 60.17) shall be used.

(2) If an owner or operator decides to exclude nonreactive organic compounds from the percent VOC content of the process fluid, the exclusion will be allowed, provided:

(i) Those substances excluded are those considered by the Administrator as having negligible photochemical reactivity; and

(ii) The owner or operator demonstrates that the percent VOC content, excluding nonreactive organic compounds, can be reasonably expected never to exceed 1.0 percent VOC by weight.

(3)(i) An owner or operator may use engineering judgment rather than the procedures in paragraphs (e) (1) and (2) of this section to demonstrate that the VOC content does not exceed 1.0 weight percent provided that the engineering judgment demonstrates that the VOC content clearly does not exceed 1.0 weight percent. When an owner or operator and the Administrator do not agree on whether a piece of equipment is not in VOC service, however, the procedures in paragraphs (e) (1) and (2) of this section shall be used to resolve the disagreement.

(ii) If an owner or operator determines that a piece of equipment is in VOC service, that determination can be revised only after following the procedures in paragraph (e) (1) and (2) of this section.

(f) Samples used in conjunction with paragraphs (d) and (e) shall be representative of the process fluid that is contained in or contacts the equipment.

(g)(1) Reference Method 22 shall be used to determine the compliance of flares with the visible emission provisions of this subpart.

(2) The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.

(3) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K\left(\sum_{i=1}^{n} C_i H_i\right)$$

where:

H_T=Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25°C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20°.

K = Constant,

$$1.740 \times 10^7 \left(\frac{1}{\text{ppm}}\right)\left(\frac{\text{g mole}}{\text{scm}}\right)\left(\frac{\text{MJ}}{\text{kcal}}\right),$$

where standard temperature for

$$\left(\frac{\text{g mole}}{\text{scm}}\right)$$

is 20°C.

C_i=Concentration of sample component i in ppm, as measured by Reference Method 18 and ASTM D2504-67 (reapproved 1977) (incorporated by reference as specified in § 60.17.

H_i=Net heat of combustion of sample component i, kcal/g mole. The heats of combustion may be determined using ASTM D2382-76 (incorporated by reference as specified in § 60.17) if published values are not available or cannot be calculated.

(4) The actual exit velocity of a flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Method 2, 2A or 2C, as appropriate; by the unobstructed (free) cross sectional area of the flare tip.

(5) The maximum permitted velocity, V_{max}, for air-assisted flares shall be determined by the following equation:

V_{max}=8.706+0.7084 (H_T)

V_{max}=Maximum permtted volicity, m/sec.

8.706=Constant.

0.7084=Constant.

HG2T=The net heating value as determined in paragraph (g)(4).

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 60.636 Recordkeeping requirements.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this

(b) When each leak is detected as specified in §§ 60.632-2, -3, -4, -6, and -7, the following requirements apply:

(1) A weatherproof and readily visible identification, marked with the equipment identification number, shall be attached to the leaking equipment.

(2) The identification on a valve may be removed after it has been monitored for 2 successive months as specified in § 60.632-6(c) and no leak has been detected during those 2 months.

(3) The identification on a compressor or equipment, except on a valve, may be removed after it has been repaired.

(c) When each leak is detected as specified in §§ 60.632-2, 60.632-3, 60.632-4, 60.632-6, and 60.632-7, the following information shall be recorded in a log and shall be kept for 2 years in a readily accessible location:

(1) The instrument and operator identification numbers and the equipment identification number.

(2) The date the leak was detected and the dates of each attempt to repair the leak.

(3) Repair methods applied in each attempt to repair the leak.

(4) "Above 10,000 ppm" if the maximum instrument reading measured by thge methods specified in § 60.635(a) after each repair attempt is 10,000 ppm or greater.

(5) "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.

(6) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a process shutdown.

(7) The expected date of successful repair of the leak if a leak is not repaired within 15 days.

(8) Dates of process unit shutdowns that occur while the equipment is unrepaired.

(9) The date of successful repair of the leak.

(d) The following information pertaining to the design requirements for closed-vent systems and control devices described in § 60.632-9 shall be recorded and kept in a readily accessible location:

(1) Detailed schematics, design specifications, and piping and instrumentation diagrams.

(2) The dates and descriptions of any change in the design specifications.

(3) A description of the parameter or parameters monitored, as required in § 60.632-9(e) to ensure that control devices are operated and maintained in conformance with their design and an explanation of why the parameter (or parameters) was selected for the monitoring.

(4) Periods when the closed-vent systems and control devices specified in §§ 60.632-2, 60.632-3, 60.632-4 are not operated as designed, including periods when a flare pilot light does not have a flame.

(5) Dates of startups and shutdowns of the closed-vent systems and control devices specified in §§ 60.632-2, 60.632-3, 60.632-4.

(e) The following information pertaining to all compressors and equipment subject to the requirements in §§ 60.632-2, 60.632-3, 60.632-4, and 60.632-6 shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for equipment subject to the requirements of this subpart.

(2)(i) A list of identification numbers for equipment that the owner or operator elects to designate for no detectable emissions under the provisions of §§ 60.632-2(e), 60.632-3(i), 60.632-4(d), and 60.632-6(f).

(ii) The designation of this equipment as subject to the requirements of §§ 60.632-2(e), 60.632-3(i), 60.632-4(d), or 60.632-6(f) shall be signed by the owner or operator.

(3)(i) The dates of each compliance test as required in §§ 60.632-2(e), 60.632-3(i), 60.632-4(d), and 60.632-6(f).

(ii) The background level measured during each compliance test.

(iii) The maximum instrument reading measured at the equipment during each compliance test.

(4) A list of identification numbers for equipment that are in vacuum service.

(f) The following information pertaining to all valves subject to the requirements of § 60.632–6(g) shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for valves that are designated as difficult to monitor,

(2) An explanation for each valve stating why the valve is difficult to monitor, and

(3) The expected date for monitoring each valve.

(g) The following information shall be recorded in a log that is kept in a readily accessible location:

(1) Design criterion require in § 60.632–2(d)(5) and 60.632–3(f)(2), and an explanation of the design criterion; and

(2) Any changes to this criterion and the reasons for this change.

(3) An analysis demonstrating the design capacity of the natural gas processing plant.

(h) Each owner or operator electing to comply with the provisions of § 60.632–8 shall maintain records of the date, duration, and purpose of each shutdown.

(i) Information and data used to demonstrate that a piece of equipment is not in VOC service shall be recorded in a log that is kept in a readily accessible location.

(j) Information and data used to demonstrate that a reciprocating compressor is in wet gas service to apply for the exemption in § 60.632–1(f) shall be recorded in a log that is kept in a readily accessible location.

(k) The provisions of § 60.7(b) and (d) do not apply to affected facilities subject to this subpart.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414)

§ 60.637 Reporting requirements.

(a) Each owner or operator subject to the provisions of this subpart shall submit semiannual reports to the Administrator, beginning 6 months after the initial startup date.

(b) The initial semiannual report to the Administrator shall include the following information:

(1) Process unit identification.

(2) Number of valves subject to the requirements of § 60.632–6 or § 60.633, excluding those valves designated for no detectable emissions under the provisions of § 60.632–6(f).

(3) Number of pumps subject to the requirements of § 60.632–2, excluding those pumps designated for no detectable emissions under the provisions of § 60.632–2(e) and those pumps complying with § 60.632–2(f).

(4) Number of compressors subject to the requirements of § 60.632–3(b)–(h).

(5) Number of pressure relief devices subject to the requirements of § 60.632–4, except those pressure relief devices designated for no detectable emissions under the provisions of § 60.632–4(d), and those pressure relief devices complying with § 60.632–4(e).

(c) All semiannual reports to the Administrator shall include the following information, summarized from the information recorded in § 60.636:

(1) Process unit identification.

(2) For each month during the semiannual reporting period,

(i) Number of valves for which leaks were detected as described in § 60.632–6(b) or 60.633–2.

(ii) Number of valves for which leaks were not repaired as required in § 60.632–6(d).

(iii) Number of pumps for which leaks were detected as described in § 60.632–2 (b) and (d)(6).

(iv) Number of pumps for which leaks were not repaired as required in § 60.632–2 (c) and (d)(6).

(v) Number of compressors for which leaks were detected as required in § 60.632–3(g).

(vi) Number of compressors for which leaks were not repaired as required in § 60.632–3(h).

(vii) Number of pressure relief devices for which leaks were detected as required in § 60.632–4(b).

(viii) Number of pressure relief devices for which leaks were not repaired as required in § 60.632–4(c).

(ix) The facts that explain each delay of repair and, where appropriate, why a process unit shutdown was technically infeasible.

(3) Dates of process unit shutdowns which occurred within the semiannual reporting period.

(4) Revisions to items reported according to paragraph (b) of this section if changes have occurred since the initial report or subsequent revisions to the initial report.

(d) An owner or operator electing to comply with the provisions of §§ 60.633–1 and 60.633–2 shall notify the Administrator of the alternative standard selected 90 days before implementing either of the provisions.

(e) An owner or operator shall report the results of all performance tests in accordance with § 60.8 of the General Provisions. The provisions of § 60.8(d) do not apply to affected facilities subject to the provision of this subpart, except that an owner or operator shall notify the Administrator of the schedule for the initial performance tests at least 30 days before the initial performance tests.

(f) The requirements of paragraphs (a) through (c) of this section remain in force until and unless EPA, in delegating enforcement authority to a State under Section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of the obligation to comply with paragraphs (a) through (c) of this section, provided that they comply with the requirements established by the State.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

[FR Doc. 84–1502 Filed 1–19–84; 8:45 am]
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40 CFR Part 60

[AD–FRL 2307–3]

Standards of Performance for New Stationary Sources; Onshore Natural Gas Processing SO_2 Emissions From Onshore Natural Gas Processing

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule and notice of public hearing.

SUMMARY: The proposed standards would limit atmospheric emissions of sulfur dioxide (SO_2) from new, modified, and reconstructed sweetening and sulfur recovery units in the natural gas production industry. The standards do not regulate sulfur content in natural gas; instead, they apply only to SO_2 emissions from gas processing (sweetening and sulfur recovery) facilities. Standards that limit volatile organic compounds (VOC) from the natural gas production industry are also being proposed in a separate **Federal Register** notice.

The standards implement Section 111 of the Clean Air Act and are based on the Administrator's determination that the crude oil and natural gas production industry contributes significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. The intended effect is to require new, modified, and reconstructed affected facilities in the natural gas production industry to reduce emissions by using the best demonstrated system(s) of continuous emissions reduction, considering costs, nonair quality health, and environmental and energy impacts.

A public hearing will be held, if requested, to provide interested persons an opportunity for oral presentation of

data, views, or arguments concerning the proposed standards.

DATES: *Comments.* Comments must be received on or before April 6, 1984.

Public Hearing. If anyone contacts EPA requesting to speak at a public hearing by February 15, 1984, a public hearing will be held on March 7, 1984, beginning at 9:00 a.m. Persons interested in attending the hearing should call Mrs. Pat Finch at (919) 541–5578 to verify that a hearing will occur.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate, if possible) to: Central Docket Section (LE–131), Attention: Docket No. A–80–20–A, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

Public Hearing: If anyone contacts EPA requesting to speak at a public hearing by February 15, 1984, the public hearing will be held at EPA Auditorium, corner of Highway 54 and Alexander Drive. Persons interested in attending the hearing should call Mrs. Pat Finch at (919) 541–5578 to verify that a hearing will occur. Persons wishing to present oral testimony should notify Mrs. Pat Finch, Emission Standards and Engineering Division (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541–5578.

Request to Speak at Hearing: Persons wishing to present oral testimony must contact EPA by February 15, 1984.

Background Information Document. The background information document (BID) for the proposed standards may be obtained from the U.S. EPA Library (MD–35), Research Triangle Park, North Carolina 27711, telephone number (919) 541–2777. Please refer to "SO_2 Emissions in Natural Gas Production Industry—Background Information for Proposed Standards," EPA–450/3–82–023a.

Docket. Docket No. A–80–20–A, containing information used by EPA in development of the proposed standards for SO_2 emissions, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

Policy issues contact: Mr. Gilbert H. Wood, Standards Development Branch, Emissions Standards and Engineering Division (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541–5578.

Technical issues contact: Mr. James F. Durham, Chemical and Petroleum Branch, Emission Standards and Engineering Division (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541–5671.

SUPPLEMENTARY INFORMATION:

Proposed Standards

The affected facilities to which the proposed standards apply include each new (i.e., a newly constructed, modified, or reconstructed) sweetening unit and each new sweetening unit followed by a sulfur recovery unit at onshore natural gas processing facilities.

Standards of performance for new sources established under Section 111 of the Clean Air Act reflect:

> * * * application of the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and any nonair quality health, and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated (Section 111(a)(1)).

For convenience, this will be referred to as "best demonstrated technology" or BDT.

BDT for SO_2 emissions from onshore natural gas processing is based on control through sulfur recovery. Different control technologies are available which achieve varying degrees of sulfur recovery (i.e., control). These technologies include 2-state and 3-stage Recycle Selectox sulfur recovery units, 2-state and 3-stage Claus recovery units, Sulfreen tail gas units, Shell Claus off-gas treatment (SCOT) units, and Beavon sulfur removal process (BSRP) units. The performance capabilities and the cost per megagram emission reduction of these systems depend on the ratio of hydrogen sulfide (H_2S) to carbon dioxide (CO_2) and the total quantity of sulfur in the gas stream being treated. These two characteristics vary considerably from plant to plant within the industry. EPA considered the performance and cost differences of applying each of these control systems to different categories of plants within the industry. That is, for a wide range of model plant types with differing H_2S/CO_2 rates and sulfur feed rates, EPA evaluated the performance capability of each of the control technologies and the cost per megagram emission reduction of applying each technology. Because these factors vary, BDT selected for SO_2 from the natural gas production industry includes multiple emission limits. The limit which is applicable to a particular plant type is determined by the H_2S/CO_2 ratio and sulfur feed rate at that plant, and reflects technology and cost considerations for that plant type. Sweetening units producing less than 1.0 long tons per day (LT/D) of sulfur are not subject to the control requirements of the proposed standards.

The level of performance achievable by most of the control systems on which the standards are based is dependent on the age of the catalyst being used. That is, the performance of a given control system is higher when the system is initially installed and the catalyst is new than it is later after the catalyst degrades. In calculating costs for the control systems, it was assumed the catalysts would be replaced every 4 years. This is consistent with current industry practice. Because of catalyst degradation, a plant cannot be expected to achieve the same emission limit on a continuous basis that it can achieve when the control system is initially installed. For this reason, the proposed standards include two emission limits applicable to each affected facility, one which must be met during the initial performance test and a less stringent emmision limit which must be met on a continuing basis after the initial performance test. The proposed standards include equations for determining both the initial and continuous emisssion limits for a given plant. The emission limits are in terms of percent reduction of sulfur.

For facilities with sulfur feed rates of more than 5.0 LT/D, the required efficiencies to be met during the initial performance test would vary from about 92 to 99.8 percent and the required efficiencies to be met on a continuous basis would vary between about 90 and 99.8 percent. In each case the required efficiency for a particular plant would depend on the H_2S/CO_2 ratio and sulfur feed rate at that plant. Facilities with sulfur feed rates of at least 1.0 LT/D but less than or equal to 5.0 LT/D would be required to reduce SO_2 emissions by 79.0 percent initially and 74.0 percent on a continuous basis. The averaging time for all emission limits would be 12 hours.

Initial performance tests would be required within 180 days of startup. Reference Method 6 would be used to measure SO_2 emissions. Reference Method 15 or proposed Reference Method 16A (depending on the nature of the compounds or the stack gas oxygen content) would be used to measure TRS. The H_2S concentration in the acid gas would be measured by ASTM E–260 or the Tutwiler method, which is published in this **Federal Register** notice.

The standards would require continuous monitoring of SO_2 emissions or total reduced sulfur compound (TRS) emissions, depending on whether the sulfur compounds are combusted prior to being emitted. Continuous monitoring of the sulfur production rate and the incinerator operating temperature would also be required. A temperature of at least 811° K (1,000° F) is required to convert H_2S to SO_2. Since only SO_2 will be monitored, all H_2S must be converted; otherwise, additional monitoring of H_2S would be necessary to achieve an accurate measurement of stack emissions. Monitoring results would be used to determine whether the control systems are being operated and maintained properly.

For the purpose of excess emissions reports, required by the General Provisions, excess emissions are defined as (1) any 12-hour period during which the efficiency achieved (determined by the continuous monitoring results) is less than the efficiency required to be met on a continuous basis, or (2) any 12-hour period during which the average temperature of the gas leaving the combustion zone of the incinerator is less than 811° (1,000° F). No additional periodic reports are required by the standards.

Summary of Environmental Energy, and Economic Impacts

Based on a projected growth of 44 new sweetening units with sulfur feed rates of at least 1.0 LT/D, the proposed standards would reduce SO_2 emissions from the natural gas production industry by about 86,200 megagrams per year (95,000 tons per year) in the fifth year of implementation. This represents a reduction in SO_2 emissions of 78 percent from State implementation plan (SIP) levels.

The best demonstrated technology upon which the proposed standards are based would not result in any adverse water pollution impacts. There would be no significant impact on solid waste disposal.

The proposed standards would increase total nationwide energy usage by 7.8×10^{14} Joules per year (25.9 megawatts) in the fifth year of implementation.

To comply with the SO_2 standards, the increase in fixed-capital costs to industry over the first 5 years would be $102 million. The increase in annualized costs would be about $31 million in the fifth year. This increase in annualized costs represents about 1 percent of the revenue generated by the sale of the processed sour natural gas in the fifth year. Plants affected by the SO_2 standards may also be subject to the VOC standards for the natural gas production industry that are being proposed in a separate **Federal Register** notice. Not all plants would be affected by both standards; only natural gas plants that separate natural gas liquids from field gas and/or fractionate natural gas liquids, in addition to sweetening sour gas, would be impacted by both the SO_2 and VOC standards. Costs to comply with the VOC standards alone and to comply with both the VOC and SO_2 standards were also analyzed. The economic impacts were evaluated and were determined to be reasonable. The proposed regulations are not expected to have an effect on incentives to develop new sour natural gas fields.

Rationale

Selection of Source for Control

The EPA priority list (40 CFR 60.16, amended at 47 FR 951, January 8, 1982) ranks, in order of priority for standards development, various source categories in terms of quantities of nationwide pollutant emissions, the mobility and competitive nature of each source category, and the extent to which each pollutant endangers health and welfare. The priority list reflects the Administrator's determination that emissions from the listed source categories contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare, and is intended to identify major source categories for which standards of performance are to be promulgated. The crude oil and natural gas production industry is ranked 29th out of 59 source categories on the priority list. Sulfur dioxide (SO_2) and volatile organic compounds (VOC) are the primary pollutants from this industry.

The crude oil and natural gas production industry encompasses not only processing of the natural gas (associated or not associated with crude oil) but operations of exploration, drilling, and subsequent removal of the gas from porous geologic formations beneath the earth's surface. There is generally only a small amount of crude oil, if any, associated with field gas in natural gas wells. The crude oil is separated from the field gas at the well site and transported by field lines to storage tanks, before being transported to refineries. These operations are not sources of SO_2 emissions and therefore are not covered by these standards. After the field gas has been separated from the crude oil and condensates, it is further processed. If the gas is sour, hydrogen sulfide (H_2S) and carbon dioxide (CO_2) are removed. This process is called "sweetening" of natural gas; the separated gas stream of H_2S and CO_2 is called "acid gas." The acid gas is further processed for elemental sulfur recovery or incinerated. The SO_2 standards affect only the processing of sour natural gas, which is a subgroup of all natural gas. The remaining gas is referred to as sweet gas and does not contain significant quantities of sulfur.

Data from the American Gas Association (AGA) and from a gas plant survey conducted by the American Petroleum Institute (API) in 1982 were used to project growth in the industry over the 5-year period following proposed of the standards (1983–1987). In 1980, the AGA published its estimation of natural gas production for each year through the year 2000. Total new onshore production for the period 1983–1987 was projected to be about 79 billion cubic meters (2,800 billion cubic feet). Historically, natural gas produced offshore has been sweet gas. The EPA assumed offshore production during the first five years after proposal of the standards would continue to be sweet gas. Therefore, offshore production was not considered in the development of the growth projections.

The data provided by API described the H_2S composition of over 700 onshore natural gas streams processed in 1982. The data indicate that approximately 25 percent of current onshore natural gas production is sour. Assuming that this percentage will remain constant over the next 5 years, EPA projects that there will be about 20 billion cubic meters (690 billion cubic feet) of new sour gas produced between 1983 and 1987. Seventy-four percent of the new sour gas, approximately 15 billion cubic meters (510 billion cubic feet), will contain an average H_2S concentration of 5.8 mole percent, and the remaining 5.0 billion cubic meters (180 billion cubic feet) will contain an average H_2S concentration of 0.2 mole percent. This predicted H_2S composition of new gas production was then used to calculate the amount of sulfur that would be present in the new sour gas. The amount of sulfur was then distributed among various sizes of sweetening plants, ranging from less than 0.1 LT/D of sulfur feed rate to 1,000 LT/D. The distribution was based on the range of existing plant sizes and the proposition of existing plants in each size category. The resulting growth projections indicate that 67 new sweetening plants will be constructed during the next 5 years, ranging in size from less than 0.1 LT/D to 1,000 LT/D of sulfur feed rate.

A large potential for reductions in SO_2 emissions exists with the projected growth. The fifth-year (end of 1987) increase in nationwide SO_2 emissions is estimated to be 110,000 megagrams per year (121,000 tons/yr), based on current SIP requirements.

The quantities and sources of VOC emissions from this industry are described in a separate **Federal Register** notice, in which a standard for equipment leaks of VOC is proposed. This VOC standard would cover processing of sweet, as well as sour, natural gas.

Selection of Pollutants

As stated in the previous section, onshore natural gas processing is a major source of SO_2 emissions. SO_2 emissions comprise over 97 percent of all the pollutants emitted from a typical onshore natural gas sweetening or sulfur recovery facility. Baseline emissions of SO_2 from a typical 5 LT/D facility are 3,550 megagrams per year (3,900 tons/yr) and those from a large facility with a sulfur feed rate of 1,000 LT/D are 23,900 megagrams per year (23,300 tons/yr). It is expected that over the 5-year period of 1983–1987, annual nationwide SO_2 emissions from this industry will increase by about 110,000 megagrams per year (121,000 tons/yr) if emissions are controlled to the level of existing applicable regulations (typical SIP regulations) or voluntary control levels. These incremental emissions, due to growth in the industry, can be significantly reduced by available sulfur recovery technologies that have been demonstrated.

The industry also emits VOC, nitrogen oxides (NO_x), H_2S, and very small quantities of carbonyl sulfide (COS) and carbon disulfide (CS_2). A standard for VOC is being proposed separately. Sources of NO_x are being addressed by other standards. Most of the potential H_2S, COS and CS_2 which would be emitted by plants are converted (due to their toxicity and odor) into SO_2 through incineration (Docket entry A–80–29–A, II–E–32). As such, both the technology upon which the standard is based and the standard, which is expressed in terms of total sulfur, effectively limit H_2S, CS_2, and COS emissions as well as SO_2 emissions.

For the reasons stated in the preceding paragraphs, SO_2 and VOC are the only pollutants in the natural gas production industry selected for regulation by standards of performance at this time.

Selection of Affected Facilities

As explained previously, SO_2 is emitted from onshore natural gas facilities that process sour gas. The point at which the SO_2 is emitted depends on whether the plant only sweetens the gas or sweetens the gas and recovers the sulfur. If the plant only sweetens the gas, the SO_2 is emitted from an incinerator following the sweetening operation. If the plant sweetens the gas and also recovers sulfur, the SO_2 is emitted from the sulfur recovery unit or from an incinerator following the sulfur recovery unit.

The choice of the affected facilities for these standards is based on the Agency's interpretation of Section 111 of the Clean Air Act and on the judicial construction of its meaning [ASARCo, Inc. vs EPA, 578 F. 2d 319 (D.C. Cir 1978)]. Under Section 111, the standards of performance for new stationary sources must apply to "new sources;" "source" is defined as "any building, structure, facility, or installation which emits or may emit air pollutants, and which may be viewed as sources." EPA therefore uses the term "affected facility" to designate the equipment within a particular kind of plant which is chosen as the "source" covered by a given standard.

In designating the affected facility, EPA must decide which piece or group of equipment is the appropriate unit (the source) for separate emission standards in the particular industrial context involved. The Agency must do this by examining the situation in light of the terms and purpose of Section 111. One major consideration in this examination is that the use of a narrow designation results in bringing replacement equipment under standards of performance sooner. This ensures that new emission sources within plants will be brought under the coverage of the standards as they are installed.

In the case of SO_2 emissions from onshore natural gas processing plants, the most narrow designation for the affected facility would be each sweetening unit and each sweetening unit with a sulfur recovery unit, depending upon what exists at a particular plant. Since there are no other statutory factors that lead to selection of a broader designation of affected facility, the proposed standards designate the affected facility in the most narrow way, as described above.

Selection of Control Technologies for Best Demonstrated Technology (BDT)

The technologies selected as candidates for best demonstrated technology (BDT) were: 2-stage and 3-stage Recycle Selectox sulfur recovery units, 2-stage and 3-stage Claus sulfur recovery units, Sulfreen tail gas units, Shell Claus off-gas treatment (SCOT) units, and Beavon sulfur removal process (BSRP) units. The performance capabilities of these systems vary depending on the H_2S concentration in the acid gas.

A 2-stage Claus sulfur recovery unit is capable of attaining recovery efficiencies between approximately 93.0 percent (with a 12.5 percent inlet H_2S concentration) and 96.3 percent (with an 80 percent inlet H_2S concentration). A 3-stage Claus sulfur recovery unit increases sulfur recovery to between about 94.7 percent (with a 12.5 percent H_2S inlet concentration) and 97.3 percent (with an 80 percent inlet H_2S concentration). The Claus process becomes less efficient in recovering sulfur and less cost effective as the H_2S concentration in the acid gas feed decreases. The recently developed Recycle Selectox process is more efficient and more cost effective than the Claus process on streams with low H_2S concentrations. The performance of the Recycle Selectox process, like the Claus process, varies with varying H_2S concentrations. The Selectox process can be designed as a once-through process without a recycle stream for processing acid gas streams with H_2S concentrations up to about 5 mole percent. For H_2S concentrations higher than 5 mole percent, a recycle stream is needed to maintain proper reaction conditions. A 2-stage Recycle Selectox sulfur recovery unit is designed to attain recovery efficiencies with fresh catalyst at the start of the operating run between about 80.6 percent (with a 2 percent inlet H_2S concentration) and 92.3 percent (with a 12.5 percent inlet H_2S concentration). A 3-stage Recycle Selectox sulfur recovery unit is designed to attain recovery efficiencies between about 83.6 percent (with a 2 percent H_2S concentration) and 95.1 percent (with a 12.5 percent H_2S concentration).

There are three demonstrated tail gas technologies available for use in conjunction with the Claus process to achieve a higher degree of control. The Sulfreen process is capable of increasing the Claus sulfur recovery efficiency to approximately 97.9 percent (with a 12.5 percent H_2S inlet concentration) and 98.8 percent (with an 80 percent H_2S inlet concentration). The SCOT process can increase sulfur recovery efficiency from 94.7 percent to 99.9 percent. The process is adaptable to a variety of Claus units and is flexible over a wide range of operating conditions. The BSRP can increase sulfur recovery for a 3-stage Claus unit to 99.9 percent.

In addition to these technologies there are other processes such as the Cold Bed Absorption (CBA) process that may achieve comparable emission reductions at comparable costs. These processes could be used to meet the standard, provided they achieve the required emission reduction efficiency. The technologies selected as candidates for BDT are described in detail in Chapter 4 of the BID.

Selection of Model Plants and Regulatory Alternatives

The sulfur feed rate and the ratio of H_2S to CO_2 in the acid gas entering a sulfur recovery unit vary from plant to plant. Both the effectiveness and the costs of sulfur recovery technologies depend on these two process parameters. Therefore, model plants covering the typical range in sulfur feed rates and in H_2S/CO_2 ratios expected in the industry were developed to evaluate specific regulatory alternatives. The sulfur feed capacities of these model plants range from less than 0.1 to 1,000 LT/D; the H_2S/CO_2 ratios evaluated range from less than 5/95 to over 80/20.

Baseline control technology, that level of control expected to be used in new plants in the absence of a new source performance standard, is referred to as Regulatory Alternative I. Baseline control technologies range in sulfur reduction efficiency between 0 and 97.3 percent. At the present time sulfur control technology is being used to comply with existing State regulations and to recover marketable sulfur at some facilities.

To develop alternatives beyond the baseline, the various levels of technology presented in "Selection of Control Technologies for BDT" were applied to each of the model plants. Annualized costs and emission reductions were calculated for each model plant/control technology combination. The calculations were used to determine the additional cost per megagram of SO_2 remove (cost effectiveness) beyond baseline for each model plant/control technology combination. The incremental cost per megagram of SO_2 removed between progressively more effective control technologies was also calculated for each model plant. These costs are presented in Chapter 8 of the BID.

Consistency in the incremental cost effectiveness was used to group the model plant/control technology combinations into five progressively more stringent control levels. (See Table 1.) These control levels are referred to as Regulatory Alternatives II through VI.

TABLE 1.—MODEL PLANT/CONTROL TECHNOLOGY COMBINATIONS FOR EACH REGULATORY ALTERNATIVE

Model plants: Sulfur feed rate LT/D	Model plants: H_2S to CO_2 ratio	Average incremental cost effectiveness [1] ($/Mg) / Maximum incremental cost effectiveness [2] ($/Mg)	Regulatory alternative: I	II	III	IV	V	VI
		Average		21	519	1,170	6,300	17,500
		Maximum		36	1,030	1,680	23,700	44,800
<0.1	([3])		None	None	None	None	None	None.
0.2	([3])		None	None	None	None	None	Recycle Selectox 2-stage.
0.3	([3])		None	None	None	None	Recycle Selectox 2-stage.	Recycle Selectox 2-stage.
0.4	([3])		None	None	None	None	Recycle Selectox 2-stage.	Recycle Selectox 3-stage.
0.5 to 0.9	([3])		None	None	None	Recycle Selectox 2-stage.	Recycle Selectox 3-stage.	Sulfreen.
1.0 to 2.0	([3])		None	None	Recycle Selectox 2-stage.	Recycle Selectox 2-stage.	Recycle Selectox 3-stage.	Sulfreen.
3.0 to 5.0	([3])		None	None	Recycle Selectox 2-stage.	Recycle Selectox 3-stage.	Sulfreen	Sulfreen.
10	([4])		Claus 2-stage	Claus 2-stage	Claus 3-stage	Claus 3-stage	Sulfreen	Sulfreen.
100	([4])		Claus 3-stage	Claus 3-stage	Sulfreen	Sulfreen	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.
555	50/50		Claus 3-stage	Sulfreen	Sulfreen	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.
555	80/20		Claus 3-stage	Sulfreen	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.
1,000	50/50		Claus 3-stage	Sulfreen	Sulfreen	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.
1,000	80/20		Claus 3-stage	Sulfreen	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.	SCOT/BSRMDEA or BSRP.

[1] Incremental cost effectiveness is the ratio of the additional cost and the additional emission reduction for moving from one regulatory alternative to the next more stringent alternative. The incremental cost effectiveness within a particular alternative varies among the different model plants, depending on technology cost and performance. This is the average incremental cost effectiveness for all model plants within an alternative for which additional control is required in that alternative.

[2] See footnote Number 1. This is the maximum incremental cost effectiveness for any model plant within an alternative for which additional control is required in that alternative.

[3] Covers entire range from less than 2/98 to over 80/20. Emission reductions, however, were calculated assuming 2/98 to 12.5/87.5, which tends to give higher cost effectiveness figures.

[4] Covers the entire range from 12.5/87.5 to over 80/20.

For each model plant, each regulatory alternative is based on the control technology that is the most effective within the range of incremental cost effectiveness established for that particular regulatory alternative. Model plants that did not have an available control technology with incremental cost effectiveness within the range for the next more stringent alternative continued to keep the technology option from the previous (less stringent) regulatory alternative until the cost per Mg was within the appropriate range for a more stringent alternative. For example, in developing the regulatory alternatives for the model plant with a 100 LT/D sulfur feed rate, the control technology having costs within the designated range of Regulatory Alternative III was the Sulfreen process. The SCOT and BSRP processes, which achieve greater emission reductions, were considered for Alternative IV but the costs were outside the designated range for Alternative IV. Therefore, the Sulfreen process was selected for Alternative IV. The SCOT and BSRP processes were again considered in Alternative V. Because the costs were within the designated range, the SCOT and BSRP processes were selected for Alternative V. This methodology was applied in selecting the control technologies to be used in each regulatory alternative for each model plant size.

In summary, the formulation of specific alternatives was based upon the consistency of the incremental cost per megagram SO_2 reduced beyond the previous alternative. The model plants and regulatory alternatives are further detailed in Chapter 6 of the BID.

Environmental Impacts

In making projections about the number and size of new sweetening and sulfur recovery facilities it was assumed that new plants would reflect the 1982 average plant sizes and their distribution. The expected distribution of new facilities in terms of quantity of sulfur in the acid gas is as follows: 23 facilities with less than 1 LT/D of H_2S, 14 facilities with 1 through 5 LT/D, 18 facilities with 10 LT/D, 9 facilities with 100 LT/D, 2 facilities with 555 LT/D, and 1 facility with 1,000 LT/D. Most facilities with 5 LT/D or less were projected to have no sulfur recovery; the rest were projected to have some sulfur recovery.

Table 2 presents a summary of the projected nationwide emission reduction that would be associated with implementing Regulatory Alternatives II through VI.

TABLE 2.—NATIONWIDE IMPACTS ON NEW FACILITIES

[1987: 67 NEW FACILITIES]

Alternative	Impact					
	I (baseline)	II	III	IV	V	VI
Five year cumulative capital cost beyond the baseline, dollars million/year		4.7	102	115	349	419
Fifth-year annualized cost beyond the baseline, dollars million/year		0.58	30.7	33.5	118	125
Fifth-year SO_2 emission reduction beyond the baseline, 1,000 Mg/yr		28.2	86.2	88.6	102.6	103.0
Cost effectiveness, dollars/Mg SO_2		21	356	378	1,150	1,210
Incremental cost effectiveness, dollars/Mg SO_2		21	519	1,170	6,300	17,500

The fifth-year reduction in emissions beyond baseline is estimated to be 26 percent for Alternative II, 78 percent for Alternative III, 81 percent for Alternative IV, 93 percent for Alternative V, and 94 percent for Alternative VI.

The technologies selected as candidates for best demonstrated technologies for each regulatory alternative do not result in any adverse water impacts. Also, implementation of any of Regulatory Alternatives II through VI does not result in any adverse solid waste impact. Spillage during transport of liquid sulfur is negligible.

Cost and Economic Impacts

Operation of the baseline technology (Alternative I) is estimated to result in a net fifth-year annualized credit of $88 million due to the sale of recovered sulfur and the use of by-product steam. Sulfur production from onshore natural gas processing and refinery operations has consistently increased: from 2 percent of the total domestic sulfur supply in 1950 to over 25 percent of the total in 1975. The sulfur produced from onshore natural gas processing amounted to 12.9 percent of domestic supply in 1978. Published prices of elemental sulfur indicate that the price has increased over 198 percent, from $31.49 per megagram in December 1969 to $93.99 per megagram in November 1979. Although the sulfur price has fluctuated during this period, it has increased on a consistent basis. These data indicate continued ability to sell the sulfur produced from the gas. However, EPA recognizes that some small plants (producing less than 5 LT/D of sulfur) may not be able to market recovered sulfur as readily as larger plants. For this reason, the annualized costs calculated for plants with sulfur feed rates below 5 LT/D do not include credits for recovered sulfur. Instead, storage and disposal costs of recovered sulfur were included.

The increase in the fifth-year capital and net annualized costs associated with implementing Regulatory Alternatives II through VI beyond Alternative I are presented in Table 2.

A detailed analysis of the economic and cost impacts of the regulatory alternative is included in Chapter 9 of the BID. The analysis considered each regulatory alternative, 21 model plant sizes (ranging in sulfur feed rates from less than 0.1 to 1,000 LT/D), and the normal range of H_2S concentrations (0.5 to 20 mole percent) in the sour natural gas currently found in the industry. Incremental cost per thousand standard cubic feet of sweetened natural gas produced was determined for each combination of control technology, plant size, and sour natural gas H_2S concentration. As a result of the competitive nature of the fuel industry, individual onshore natural gas sulfur recovery plant operators are not expected to pass additional sulfur emissions control costs on to the consumers. Sour gas producers are generally expected to absorb the additional emissions control costs out of revenues generated from the sale of sweet gas and recovery sulfur.

Under all regulatory alternatives, nationwide costs of compliance are approximately 1 percent of the total projected value of all new onshore natural gas (sweet and sour) production. Thus, under Regulatory Alternatives I through VI, the impacts of SO_2 emissions control costs on expected returns from natural gas exploration and development are small; and, therefore, the effect of any of these alternatives on exploration and development would likely be negligible. Under Regulatory Alternatives I through IV, nationwide costs of compliance would be about 1 percent of the total revenue from the sale of processed sour natural gas in 1987. Under Regulatory Alternatives V and VI, nationwide costs of compliance could be approximately 4.0 and 4.2 percent, respectively, of the total revenue from the sale of processed sour natural gas in 1987. Consequently, Regulatory Alternatives I through VI would be expected to have no effect on industry incentives to develop new sour natural gas fields. Although none of the regulatory alternatives is expected to affect incentives to develop new gas fields, Alternatives IV through VI could adversely affect the economic viability (i.e., total production costs may exceed total plant revenues) of some small (less than 1 LT/D) sour gas processing facilities. Under Regulatory Alternative VI, two projected affected facilities are expected not to be economically viable; under Regulatory Alternative V, one projected affected facility is expected not to be economically viable. Regulatory Alternative IV is less likely to cause adverse economic impacts than Alternative V and VI. However, Alternative IV could affect the economic viability of some plants with sulfur production rates below 1.0 LT/D

Alternatives III and II are not expected to result in any unreasonably adverse economic impacts.

Energy Impacts

The application of baseline controls (Regulatory Alternative I) to new affected facilities in the natural gas production industry is estimated to increase energy consumption by 53.9×10^{14} Jouls per year (178 megawatts) of energy in the fifth year (1987) after proposal. Increased energy utilization is primarily to meet electric and steam energy needs for sulfur recovery plant operation and the fuel requirements for incineration of any residual H_2S prior to discharge the atmosphere. The fifth-year (end of 1987) increase in energy consumption over Regulatory Alternative I is estimated to be 0.48×10^{14} Joules per year (1.57 megawatts) for Regulatory Alternative II; 7.8×10^{14} Joules per year (25.9 megawatts) for Regulatory Alternative III, 8.6×10^{14} Joules per year (28.6 megawatts) for Regulatory Alternative IV; 19.3×10^{14} Joules per year (64.1 megawatts) for Regulatory Alternative V; and 19.4×10^{14} Joules per year (64.4 megawatts) for Regulatory Alternative VI. A detailed discussion of the energy impacts of SO_2 emission control is included in the BID, Chapter 7.

Selection of the Basis for the Proposed Standards

In selecting the basis for the proposed standards, the Administrator selected the regulatory alternative that would achieve the most emission reduction while incurring reasonable nonair quality environmental, energy, cost, and economic impacts.

A review of the nonair environmental and energy impacts indicated no significant adverse impacts for any of the regulatory alternatives. Emission reduction, cost and economic impacts were then evaluated for each alternative. Regulatory Alternative VI would achieve the most emission reduction; however, Alternative VI is expected to cause small plants with sulfur intake rates of 1 LT/D or less to be economically nonviable. In addition, the incremental cost which would be incurred to achieve the additional emission reduction of Alternative VI as compared with Alternative V (which would average $17,500 per Mg SO_2 reduced for all the affected model plants and would be a maximum of $44,800 per Mg SO_2 reduced for any affected model plant) was judged to be unreasonable. Alternative V would achieve more emission reduction than the remaining alternatives but is expected to cause small plants with sulfur intake rates of 1 LT/D and less to be economically nonviable. Further, the incremental cost per Mg SO_2 reduced for Alternative V as compared with Alternative IV (which would average $6,300 per Mg SO_2 reduced for all the affected model plants and would be a maximum of $23,700 per Mg SO_2 reduced for any affected model plant) was judged to be unreasonable.

The economic impact analysis indicated that there is some probability that plants with low sulfur feed rates (below 1 L/D) and high H_2S concentrations (4 percent or more) in the sour gas would not be economically viable under the requirements of Regulatory Alternative IV. There was sufficient probability that such plants would become nonviable to cause concern that Regulatory Alternative IV would result in unreasonable economic impacts on small plants.

The incremental cost effectiveness associated with moving from Regulatory Alternative III to Alternative IV averages $1,170 per Mg SO_2 emission reduction. The highest incremental cost effectiveness for any individual plant would be $1,680 per Mg. In assessing the reasonableness of incremental cost for a particular source category, the Agency may consider a variety of factors that may indicate that higher or lower costs per Mg would be appropriate for that source category. The incremental difference in emission reduction between Regulatory Alternative III and IV is 2,400 per Mg of SO_2 emissions per year. While this is considered to be a significant amount of emission reduction, the likelihood that most of this reduction will occur in remotely located and unpopulated areas has influenced the Administrator's judgment of what constitutes reasonable incremental costs. In addition, the location of these remote areas is limited to the western States and Texas, where acid deposition is not, at this time, known to be a problem. In light of these considerations, the Administrator decided that the incremental cost effectiveness between Regulatory Alternatives III and IV may be unreasonably high.

The potential for small plants to encounter unreasonably adverse economic impacts under Alternative IV, combined with the Administrator's judgment that the incremental cost between Alternatives III and IV may be too high for the incremental emission reduction (in view of the location of future plants), led to the decision to reject Regulatory Alternative IV as the basis for the proposed standards.

Regulatory Alternatives III, II, and I were all judged to have reasonable cost, incremental cost effectiveness, and economic impacts. Consequently, Alternative III was selected as the basis of the proposed standards rather than the less stringent alternatives because Alternative III would achieve more emission reduction than the others.

Although the economic impact analysis performed by the Agency (described in detail in Chapter 9 of the BID) indicates that there would be no unreasonable adverse economic impacts associated with the recommended standard, several industry representatives have indicated that some owners/operators of sweetening facilities producing acid gas with less than 5 LT/D of sulfur could experience unreasonable impacts. An attempt has been made to develop small plant exemption criteria (applicable to plants with sulfur intake rates between 1 and 5 LT/D) that would take plant-specific economic parameters into account in determining applicability. A summary of these materials is contained in the docket and is available for review (see Docket A-80-20-A, Entry II-B-42). However, only limited data are currently available on which to support exemption criteria based on plant-specific economic parameters. For this reason, such provisions are not incorporated in the proposed standards, but the Administrator is considering adding such provisions to the final regulation. Therefore, the Agency is soliciting comments on the exemption criteria and on the economic impact of the standard on facilities producing acid gas with less than 5 LT/D of sulfur. Any comments submitted should, where possible, include specific information and supporting calculations detailing the economic effect of controls.

The Agency also is soliciting comment on impacts that the proposed standards may have on affected facilities in the 250 to 1000 LT/D range with H_2S concentrations in the acid gas of less than 50 mole percent. Plants of this type are on the fringe of the span of model plants considered in evaluating technology costs and economic impacts of the proposed standard. Only one plant in this size and acid gas H_2S concentration range is known by the Agency to exist, and projections of affected facilities do not include additional plants of this type. The Administrator is soliciting information on whether additional large plants (greater than 250 LT/D of sulfur) with H_2S concentrations in the acid gas below 50 mole percent are expected to be construced in the United States, and whether the technology requirements of the proposed standards would have an unreasonably adverse economic impact on facilities of this type. Where possible, comments should include control cost information, supporting calculations, and specific information detailing the economic effects of controls.

Selection of the Format of the Proposed Standards

Standards for SO_2 emissions from onshore natural gas processing could be expressed as:

(i) Concentration standards that limit emissions per unit volume of exhaust gases to the atmosphere,

(ii) Mass standards that limit the mass of pollutants emitted to the atmosphere, or

(iii) Efficiency standards (based on mass or concentration) that require emissions to be reduced by a specified percent.

The format of the proposed standard needs to reflect the fact that the technologies selected as BDT vary in terms of the achievable emission reduction, depending on the mass flow rate and the concentration of H_2S in the acid gas stream at a given plant. Mass or concentration standards can take the form of limits in pounds per hour or parts per million by volume that apply uniformly, or across the board, to all facilities within a range of sulfur feed rates (sizes) and H_2S concentrations. Either of these formats would establish required emission reduction efficiencies applicable to various plant sizes. Large plants would have to achieve high reduction efficiencies and smaller plants would have to achieve increasingly lower reduction efficiencies to meet the same limit. The effect is consistent with the performance capabilities of the technologies as BDT in that the smaller plants would be required to meet lower efficiencies. However, the efficiency requirements that result from uniform mass or concentration limits do not match the reduction efficiencies that are achievable by BDT. With uniform mass or concentration limits, the emission reduction efficiencies required for small plants are far below (i.e., less stringent than) the efficiencies achievable by BDT. Consequently, uniform mass or concentration standards are inappropriate.

In lieu of the uniform mass or concentration format, an emission reduction efficiency format was selected for the proposed standard. Because the format for the standard needs to reflect the variation in the emission reduction efficiencies achievable by the selected BDT, the proposed standard takes the form of an equation that calculates the required emission reduction efficiency (or sulfur recovery efficiency) for each specific plant type based on the two characteristics of the acid gas (i.e., the mass flow rate of acid gas and the concentration of H_2S in it). The equation calculates required emission reduction efficiencies that closely match the efficiencies achievable with BDT. The result is a standard that ensures the application and the proper operation BDT at new facilities.

The equation format appears to best reflect the efficiencies achievable with the technologies in Regulatory Alternative III. However, the Agency is continuing to evaluate other formats and invites comment on alternate formats that may be appropriate.

Selection of Emission Limitations

In order to assess the emissions reduction potential of available control technologies, two design studies performed by an engineering firm with expertise in acid gas sulfur recovery facilities were evaluated. The studies provide investment costs, direct operating cost data including utilities requirements, process descriptions, and atmospheric sulfur compound emissions for 51 sweetening plant/sulfur recovery control combinations. These facilities cover a range of sulfur feed rates from 0.5 to 1,000 LT/day, with various conbinations of sulfur recovery and tail gas processes (Appendices E and H of the BID). The selection of emission limitations was based upon (1) the control systems selected as BDT for different plant types depending on the H_2S/CO_2 ratio and the sulfur feed rate, (2) the design efficiencies of the available control technologies from the engineering studies (3) technical information/data on catalyst degradation, and (4) emission source test data from facilities with demonstrated sulfur recovery technologies.

As presented above, the engineering study indicates that the sulfur recovery efficiency for any one technology varies with the acid gas ratio (i.e., as the ratio of volume percent H_2S to CO_2 increases, the sulfur recovery efficiency increases). In addition, the data indicate the the control elfficiencies of the technologies upon which the proposed standards are based generally decline over a long period of operation. This decline in efficiency is due to the fact that, in most cases, the catalysts gradually degrade with time. Information provided by industry indicates that the useful life span of a Claus catalyst bed ranges from approximately 1 to 7 years with a 3-year to 5-year range occurring most frequently.

In order to ensure that the proposed standard would result in the installation of the best demonstrated technology at each affected facility, an emission limitation as developed based on the design efficiencies achievable with new catalyst beds. This emission reduction requirement would apply to the performace of control equipment at the time of the initial performance test and considers the effects of variations in H_2S to CO_2 concentrations in the acid gas and in sulfur intake rates.

However, EPA recognizes that, for a given feed rate, the initial control efficiency may not be maintained on a continuous basis due to catalyst degradation. Therefore, a second less stringent emission limitation was developed that takes into account catalyst degradation and that can be met on a continuous basis. This second emission limitation would apply to each affected facility after the initial performance test. In developing the costs of the technologies upon which the proposed standards are based, a 4-year catalyst life was assumed to be most representative of expected useful life. This same 4-year life was assumed in developing the second (or continuous) emission limitation. Sulfur recovery design data indicate that catalyst degradation results in approximately 0.89 percent reduction in efficiency per year for a 3-stage Claus unit; 0.29 percent per year for a 3-stage Claus unit with Sulfreen tail gas treatment; 0.013 percent per year for a 3-stage Claus unit with SCOT tail gas treatment; and 1.68 percent for a 2-stage Recycle Selectox unit (Docket A-80-20-A, entries II-B-26 and II-B-27). The continuous emission limitation for the proposed standards is based on the anticipated control efficiency after 4 years of catalyst degradation. Therefore, the required efficiencies can be achieved on a continuous basis, assuming the catalysts are replaced approximately every 4 years. The cost of replacing catalysts at the frequency are judged to be reasonable. An individual plant owner may have to replace his catalyst somewhat more or less frequently than 4 years. The cost of more frequent replacement, if necessary to achieve continued compliance, is also considered reasonable.

In support of the engineering study, emission source tests were conducted at three production facilities. Plant operating parameters and conditions were obtained along with the test data. The facilities tested represent a range of both sulfur feed rates (from 18 to 1,155 LT/D) and acid gas H_2S/CO_2 (24/76 to 84/16) ratios. Additional emission source test data were gathered from seven other sulfur recovery facilities.

Six facilities that were not tested were visited during the standards development process to obtain data on the sulfur recovery efficiency of their respective sulfur recovery units. The emission test data and supplementary information confirm the engineering study sulfur recovery efficiencies for corresponding sulfur feed rates and acid gas H_2S/CO_2 ratios. Test data support the conclusion that the design efficiencies are achievable on a continuous basis in plants operating under normal conditions. The emission source test data are presented in detail in Appendix C of the BID.

The sulfur recovery technologies in Regulatory Alternative III have been selected as the basis for the standards. Regulatory Alternative III requires no control above baseline for facilities with sulfur feed rates less than 1.0 LT/D. Facilities with sulfur feed rates of at least 1.0 but less than or equal to 5.0 LT/D are required to control emissions to the level achievable with a 2-stage Recycle Selectox process. The initial performance test requirement is a 79.0 percent reduction efficiency; thereafter the standards require that the emissions be reduced, on a continuous basis, by at least 74.0 percent.

Facilities with sulfur feed rates greater than 5 LT/D are required to control emissions to levels achievable with 2-stage Recycle Selectox units, 3-stage Claus sulfur recovery units, or 3-stage Claus units with a tail gas cleanup unit, depending on the characteristics of the facility. The design efficiencies of these technologies range as follows: for a 2-stage Recycle Selectox unit—79.0 percent (with a 2.0 percent H_2S concentration) to 90.6 percent (with a 12.5 percent H_2S) concentration; for a 3-stage Claus unit—93.8 percent (with a 12.5 percent H_2S concentration) to 96.4 percent (with an 80 percent H_2S concentration); for a 3-stage Claus with a Slufreen unit—97.6 percent (with a 12.5 percent H_2S concentration) to 98.5 percent (with an 80 percent H_2S concentration); for a 3-stage Claus with a SCOT unit—99.8 percent (with a 12.5 percent H_2S concentration) to 99.9 percent (with an 80 percent H_2S concentration).

These efficiencies were used to develop a numerical relationship between sulfur feed rate, mole percent H_2S in the acid gas, and sulfur dioxide emission reduction efficiency (Docket entry A-80-20-A, II-B-27 and II-B-43). This relationship is expressed in the form of an equation that calculates the percent reduction efficiency. Compliance with this efficiency requirement would be based on 12-hour averages of sulfur intake measurements, measurements of recovered sulfur and measurements of SO_2 emissions. The equation to be used to determine the efficiency required during the initial performance test is presented below:

$$Z=88.51X^{0.0101}Y^{0.0125}$$

where:

Z = minimum required sulfur dioxide emissions reduction efficiency expressed as a percent and carried to one decimal place,
X = sulfur feed rate (i.e., the H_2S in the acid gas from the sweetening unit) expressed in long tons per day of sulfur, and
Y = sulfur content of the acid gas from the sweetening unit, expressed as mole percent H_2S.

This equation establishes a continuous functional relationship between efficiency level required, sulfur feed rate and mole percent H_2S. The SO_2 emission reduction efficiency calculated from the equation may, in some cases, exceed 99.8 percent. In these cases, however, the standard for that facility would be 99.8 percent efficiency.

A similar equation was developed based on the efficiencies achievable with catalyst beds that have been in operation for 4 years. The efficiency level required to be met on a continuous basis, following the initial performance test, is calculated using the following equation:

$$Z=85.35X^{0.0144}Y^{0.0128}$$

where X, Y, and Z have the same meaning as in the initial equation.

The highest efficiency required on a continuous basis would be 99.8 percent. The adjusted efficiency numbers achievable with either fresh or degraded catalyst for selected sulfur feed rates and acid gas ratios as calculated from the above equations, but not exceeding 99.8 percent, are presented in Table 3 as examples for the reader's information.

TABLE 3.—PERCENT EFFICIENCY REQUIREMENTS

Sulfur feed rate, LT/D	Mole percent H_2S in acid gas									
	10		20		40		60		80	
	A	B	A	B	A	B	A	B	A	B
1,000									99.8	99.7
555							99.2	98.5	99.6	98.8
100			96.2	94.7	97.0	95.6	97.5	96.1	97.9	96.4
10	93.2	90.8	94.0	91.6	94.8	92.4	95.3	92.9	95.6	93.3
5	92.5	89.9	93.3	90.7						

A: Efficiencies with fresh catalyst (initial requirements).
B: Efficiencies with degraded catalyst (continuous requirements).

NOTE.—Efficiencies are listed only for those sulfur feed rate, mole percent H_2S in acid gas combinations that are considered to be realistic based on the types of facilities currently operating.

Modification/Reconstruction Considerations

The proposed standard would apply to sweetening units and to sweetening units followed by sulfur recovery units.

"Modification" is defined in § 60.14 of the General Provisions as any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies. Exemptions from the modification provision are also described in § 60.14. Changes to existing sweetening units that would qualify as modifications are rare in this industry. Sweetening capacity is increased, when necessary, by adding an entirely new sweetening unit to existing units or by replacing an existing unit with a new, larger unit. In either case, the new unit would be subject to the standards as a newly constructed facility, but the existing units would not be changed and would not be considered modified. If the affected facility had been defined as the entire sweetening operation, which could consist of one or more sweetening units, additions or replacements of individual sweetening units could mean that the entire sweetening operation would be modified, and modifications would have been projected. However, with the designation of the affected facility as each sweetening unit, no modifications are projected.

Changes to existing sulfur recovery units that would result in an increase in the emission rate to the atmosphere are not expected to occur. Consequently, no modifications to a sweetening unit followed by a sulfur recovery unit are projected.

The definition of "reconstruction" is also described in Section 60.14 of the General Provisions. No situations in the industry are anticipated where the replacement costs would exceed 50 percent of the cost of an entirely new facility and, therefore, no reconstructions are anticipated.

Performance Test Methods

The proposed standard is based on an SO_2 emission reduction efficiency requirement. The emission reduction efficiency required (Z) for a given facility is a function of the sulfur feed rate (X) and the H_2S content (Y) of the acid gas at that facility. To determine the applicable emission reduction efficiency required, an owner or operator would use the following procedures: (1) use either the Tutwiler procedure or ASTM E-260 to determine Y, the H_2S content of the acid gas; (2) use a process flow meter to measure the average volumetric flow rate of the acid gas, and determine X, the average sulfur feed rate, using Y and the volumetric flow rate; and (3) use the values obtained for X and Y to determine Z, the required efficiency, from the equations given in Section 60.642 (a) and (b) of the proposed regulation. This procedure will be used to calculate a value for Z at least quarterly or more often if a significant change occurs in X or Y and the owner or operator elects to recalculate the required efficiency. For facilities with sulfur feed rates of 5 LT/D and less, Z is 79.0 percent during the initial performance test.

During the performance test, the emission reduction efficiency actually being achieved by the control system is compared to the required efficiency in order to determine compliance. If the achieved efficiency, R, is equal to or greater than the required efficiency (Z), the facility is in compliance. The sulfur emission reduction efficiency achieved, R, is a function of the liquid sulfur production rate (S) and the sulfur emission rate (E). R is defined as S divided by the sum of S and E, multiplied by 100.

The sulfur emission rate is obtained by measuring the concentration of sulfur compounds, i.e., sulfur dioxide (SO_2) and total reduced sulfur compounds (TRS), and calculating a total SO_2 equivalent concentration using the volumetric flow rate of the stack gas. EPA Reference Method 6 for SO_2 (40 CFR Part 60, Appendix A) and proposed Method 16A for TRS (46 FR 31904, June 18, 1981) are used without modification. The TRS measurement includes carbonyl sulfide (COS), carbon disulfide (CS_2), and H_2S.

In those facilities in which the exiting gases from the sulfur recovery units are not incinerated, the sulfur emission rate is obtained by measuring the individual reduced sulfur compounds (H_2S, COS, CS_2) using EPA Reference Method 15 rather than Method 16A. Because sufficient oxygen may not be available in the sample gases from these facilities for oxidation of the reduced compounds, Method 15, which provides for measurement of individual reduced compounds, is specified as the performance test method.

The stack gas flow rate is determined by EPA Reference Methods 1, 2, 3, and 4. Method 3 may be modified by use of thermal conductivity gas chromatography instead of the specified Orsat apparatus. The sum of the SO_2 and TRS concentrations in the stack gas, when multiplied by the stack gas flow rate and by the appropriate molecular weights of sulfur per mole for each sulfur species, yields the sulfur emission rate.

For measurement of the sulfur production rate, industry practice is to use the difference between readings of calibrated level indicators or between manual soundings of the product sulfur storage tanks. This method of sulfur production rate measurement is within acceptable accuracy of ±2% and acceptable reliability and, therefore, is considered adequate for determining compliance. The proposed standard requires measurement of the sulfur production rate over every consecutive 12-hour period.

Continuous Monitoring Requirements

Monitoring requirements can provide a convenient and necessary means for plant owners and enforcement personnel to ensure that sulfur recovery operations are properly operated and maintained. As a check against monitored data, all parameters specified under monitoring requirements would be measured and recorded during the initial performance test.

The recommended standard would require each owner or operator to measure and to record on a continuous basis and to calculate, for each 12-hour period, the SO_2 mass emission rate (E), averaged over 12 consecutive hours, through the incinerator stack to the atmosphere, or the TRS mass emission rate if a combustion device is not used.

For monitoring purposes, measurement of the liquid sulfur production rate (S) would be conducted once every 12 hours. The measurement could be performed by accepted industry practice that uses the difference of calibrated level indicator readings or of manual soundings of the product sulfur storage tanks. The liquid sulfur production rate (S) divided by the sum of the SO_2 or TRS (expressed as sulfur) emission rate (E) and the liquid sulfur production rate (S) indicates the SO_2 emission reduction (R) of the unit. The calculation of emission reduction efficiency, for continuous monitoring purposes, would yield an efficiency slightly less precise than the efficiency calculated during the performance test, because the monitoring calculation does not include emissions of TRS for recovery units with an operating incinerator. The monitoring calculation could indicate an efficiency greater than the efficiency calculated during the performance test, but the difference in calculated efficiency would be approximately 0.02 percent. This small difference is considered acceptable, as the alternative would be to require continuous monitoring of both SO_2 and TRS, and the costs of monitoring both were judged too high for the resulting slight improvement in exactness of the efficiency calculation.

The reason for selecting 12 hours as the averaging time for these calculations is to have a measurement comparable to the performance test measurement. (The performance test is the average of three test runs, each run being conducted for a period of at least 4 hours.)

Continuous monitoring of the rate of SO_2 mass emissions from the incinerator stack, when combined with the liquid sulfur production rate, gives a more precise measurement of emission reduction efficiency than use of the measured sulfur intake (LT/day) with the liquid sulfur production rate. Uncertainties in the calculated efficiency for the sulfur intake (LT/day) method could be ±7.0%, whereas for the emission method, the uncertainties could be only ±0.6%. The costs of continuous monitoring of either SO_2 or TRS for both small and large facilities are reasonable, and the emission method is the most accurate measurement of emission reduction efficiency available at reasonable costs. Therefore, the Administrator decided to require continuous monitoring of SO_2 emissions for facilities that use a sulfur recovery unit followed by an incinerator and continuous monitoring of TRS emissions for facilities that do not use an incinerator. (However, monitors for TRS are not required until specifications are promulgated.)

In addition, the proposed standard would require each sulfur recovery facility with an incinerator to measure on a continuous basis and to record, for each 12-hour period, the temperature of the gas leaving the combustion zone of the incinerator. The proposed standard requires that a temperature of 811°K (1,000°F) be maintained in order to convert the H_2S in the gas stream to SO_2. Since the required monitoring devices measure only SO_2, it is essential that all H_2S be converted to SO_2 to achieve an accurate measurement of the sulfur compounds leaving the stack. Normally, all facilities record the incinerator temperature on a periodic basis as an integral part of the operation.

Impacts of Reporting Requirements

The recommended standard would require the owners or operators of onshore natural gas processing facilities to submit four types of reports. First, there are notification reports required under the General Provisions that would enable the Agency to keep abreast of facilities subject to the standards of performance. Notification of construction, anticipated start-up, actual startup, and initial performance tests are among those activities requiring notification reports. Second, there are reports of initial performance test results. The third requirement is for quarterly reports of excess emissions as required in § 60.7(c) of the General Provisions. Fourth, reports of performance evaluations of the continuous monitoring systems are required, as described in § 60.13(c).

Section 60.7(b) requires an owner or operator of a plant to maintain records documenting the contents of the required reports and identifying whether excess emissions are due to startup, shutdown, or malfunction.

The Paperwork Reduction Act (PRA) of 1980 (Pub. L. 96–511) requires that the Office of Management and Budget (OMB) approve reporting and recordkeeping requirements that qualify as an "information collection request" (ICR). For the purposes of OMB's review, EPA's impact analysis procedures provide for estimating the labor hour burden of reporting and recordkeeping requirements on a 2-year basis. During the first 2 years of effectiveness of the proposed standard, the average annual industry-wide burden of the reporting and recordkeeping requirements associated with the proposed standard would be 8.6 person-years, based on an average of 14 respondents per year.

Public Hearing

A public hearing will be held, if requested, to discuss the proposed standards in accordance with Section 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations should contact EPA at the address given in the **ADDRESSES** section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement before, during, or within 30 days after the hearing. Written statements should be addressed to the Central Docket Section address given in the **ADDRESSES** section of this preamble.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at EPA's Central Docket Section in Washington, D.C. (see **ADDRESSES** section of this preamble).

Docket

The docket is an organized and complete file of all the information submitted for, or otherwise considered in, the development of this proposed rulemaking. The principal purposes of the docket are (1) to allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review (except for those portions of the docket excluded from the record under Section 307(d)(7)(A)).

Miscellaneous

As prescribed by Section 111, establishment of standards of performance of affected facilities in the natural gas production industry was preceded by the Administrator's determination (40 CFR 60.16, amended at 47 FR 951, dated January 8, 1982) that the crude oil and natural gas production industry contributes significantly to air pollution that may reasonably be anticipated to endanger public health or welfare.

In accordance with Section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. The Administrator will welcome comments on all aspects of the proposed regulation, including economic and technological issues. Any comments submitted to the Administrator on these issues should contain specific information and data pertinent to the issue or procedure and should suggest alternative courses of action.

This regulation will be reviewed 4 years from the date of promulgation as required by the Clean Air Act. This review will include an assessment of such factors as the need for integration with other programs, the existence of alternative methods, enforceability, improvements in emission control technology, and reporting requirements.

The information provisions associated with this proposed rule (40 CFR 60.7, 60.8, and 60.647) have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1980 U.S.C. 3501 *et seq.* Comments on these requirements should be submitted to the Office of Information and Regulatory Affairs of OMB—marked Attention: Desk Officer for the EPA. The final rule package will respond to any OMB or public comments on the information collection provisions.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any new source standard of performance under Section 111(b) of the Act. An economic impact assessment was prepared for the proposed regulations and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the proposed standards to insure that the proposed standards would represent the best system of emission reduction considering costs. The economic impact assessment is included in the background information document.

"Major Rule" Determination. Under Executive Order 12291, EPA is required to judge whether a regulation is a "major rule" and therefore subject to certain requirements of the Order. The Agency has determined that this regulation would result in none of the adverse economic effects set forth in Section 1 of the Order as grounds for finding a regulation to be a "major rule." Fifth-year annualized costs of both the SO_2 standard discussed here and the VOC standard compared to an uncontrolled situation, would be about $31 million and $2.5 million, respectively, in the worst case. The combined impact for the worst case is not expected to result in an increase of well-head natural gas wholesale prices greater than 0.1 percent per 1,000 standard cubic feet of gas. The Agency has therefore concluded that the proposed regulation is not a major rule under Executive Order 12291. In addition to economic impacts, the Agency carefully considered the overall costs per megagram of emission reduction that would result from this standard. This analysis is described under Rationale and served as a primary basis for establishing the control levels set forth in the proposed standard.

This regulation was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMN and EPA and any EPA response to those comments are available for public inspection in Docket No. A–80–20–A, EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460.

Regulatory Flexibility Analysis Certification. The Regulatory Flexibility Act of 1980 requires that adverse effects of all Federal regulations upon small business be identified. According to current Small Business Administration (SBA) guidelines, a small business in the SIC category 1311, "Crude Petroleum and Natural Gas" is one that has 500 employees or less. This is the criterion to qualify for SBA loans or for the purpose of government procurement. Of the 31 onshore natural gas sulfur recovery companies, all but one of the companies have more than 500 employees. The average employment in these companies is approximately 26,000. Therefore, it is estimated that employment in a typical company owning a new facility will average well over 500. Thus, it is unlikely that any such company would be considered a small entity. Existing small entities are not expected to become subject to the recommended standards through new construction, modification, or reconstruction.

List of Subjects in 40 CFR Part 60

Air pollution control, Aluminum, Ammonium sulfate plants, Asphalt, Cement industry, Coal, Copper, Electric power plants, Glass and glass products, Grains, Intergovernmental relations, Iron, Lead, Metals Metallic minerals, Motor vehicles, Nitric acid plants, Paper and paper products industry, Petroleum, Phosphate, Sewage disposal, Steel sulfuric acid plants, Waste treatment and disposal, Zinc, Tires, Incorporation by reference, Can suface coating, Sulfuric acid plants, Industrial organic chemicals, Organic solvent cleaners, Fossil fuel-fired steam generators.

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this rule will not have a significant economic impact on a substantial number of small entities.

Dated: January 11, 1984.

William D. Ruckelshaus,

Administrator.

PART 60—[AMENDED]

It is proposed that 40 CFR Part 60 be amended by adding a new subpart as follows:

Subpart LLL—Standards of Performance for Onshore Natural Gas Processing; SO_2 Emissions

Sec.

Authority: Sections 111 and 301(a) of the Clean Air Act, as amended, (42 U.S.C. 7411, 7601(a)), and additional authority as noted below.

Subpart LLL—Standards of Performance for Onshore Natural Gas Production: SO_2 Emissions

§ 60.640 Applicability and designation of affected facilities.

(a) The provisions of this subpart are applicable to the following affected facilities that process natural gas: each sweetening unit, and each sweetening unit followed by a sulfur recovery unit.

(b) Facilities that have a design capacity less than 1.0 long tons per day (LT/D) of hydrogen sulfide (H_2S) in the acid gas are required to comply with § 60.647(c) but are not required to comply with § 60.642 through § 60.646.

(c) The provisions of this subpart are applicable only to facilities located on land and exclude facilities located on offshore platforms.

(d) The provisions of this subpart apply to each affected facility identified in paragraph (a) of this section which commences construction or modification after January 20, 1984.

§ 60.641 Definitions.

All terms used in this subpart not defined below are given the meaning in the Act and in Subpart A of this part.

"Acid gas" means a gas stream of hydrogen sulfide (H_2S) and carbon dioxide ($(CO)_2$) that is separated from natural gas by a sweetening unit.

"Natural gas" means a naturally occuring mixture of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the earth's surface. The principal hydrocarbon constituent is methane.

"Onshore" means situated on land as opposed to over seawater.

"Reduced sulfur compounds" means H_2S, carbonyl sulfide (COS), and carbon disulfide (CS_2).

"Sulfur production rate" means the rate of liquid sulfur accumulation from the sulfur recovery unit.

"Sulfur recovery unit" means a process device that recovers elemental sulfur from acid gas.

"Sweetening unit" means a process device that separates the H_2S and CO_2 contents from the sour natural gas stream.

"Total SO_2 equivalents" means the sum of volumetric or mass concentrations of the sulfur compounds obtained by adding the quantity existing as SO_2 to the quantity of SO_2 that would be obtained if all reduced sulfur compounds were converted to SO_2 (ppmv or kg/DSCM).

"E" = the sulfur emission rate expressed as elemental sulfur, kilograms per hour (kg/hr) rounded to one decimal place.

"R" = the sulfur emission reduction efficiency achieved in percent, carried to one decimal place.

"S" = the sulfur production rate in kilograms per hour (kg/hr) rounded to one decimal place.

"X" = the sulfur feed rate, i.e., the H_2S in the acid gas from the sweetening unit, expressed in long tons per day (LT/D) of sulfur rounded to one decimal place.

"Y" = the sulfur content of the acid gas from the sweetening unit, expressed as mole percent H_2S rounded to one decimal place.

"Z" = the minimum required sulfur dioxide (SO_2) emission reduction efficiency, expressed as a percent carried to one decimal place.

§ 60.642 Standards for sulfur dioxide.

(a) When the sulfur feed rate of an affected facility is greater than 5.0 LT/D:

(1) During the initial performance test required by § 60.8(b), each owner or operator subject to the provisions of this subpart shall achieve a minimum SO_2 emission reduction efficiency (Z) for each affected facility calculated using the following equation:

$$Z = 88.51\, X^{0.0101}\, Y^{0.0125} \qquad (1)$$

In no case, however, will the required efficiency exceed 99.8 percent.

(2) After the initial performance test, each owner or operator subject to the provisions of this subpart shall maintain at least a minimum SO_2 emission reduction efficiency (Z) for each affected facility calculated using the following equation:

$$Z = 85.35\, X^{0.0144}\, Y^{0.0128} \qquad (2)$$

In no case, however, will the required efficiency exceed 99.8 percent.

(b) When the sulfur feed rate for an affected facility is at least 1.0 LT/D but less than or equal to 5.0 LT/D: During the initial performance test required by § 60.8(b), each owner or operator subject to the provisions of this subpart shall achieve an SO_2 emission reduction efficiency (Z) for that affected facility of at least 79.0 percent; after the initial compliance test, each owner or operator subject to the provisions of this subpart shall maintain an SO_2 emissions reduction efficiency (Z) for that affected facility of at least 74.0 percent.

(c) On and after the date on which § 60.8(b) requires a performance test to be completed, each owner or operator subject to the provisions of this subpart shall continuously maintain the 12-hour average temperature of the gas leaving the combustion zone of an incinerator that follows a sweetening unit above 811°K (1,000°F).

§ 60.643 Compliance provisions.

(a) To determine compliance with the standards for sulfur dioxide specified in § 60.642, the minimum sulfur dioxide emission reduction efficiency (Z) is compared to the emission reduction efficiency (R), achieved by the sulfur recovery technology during the performance test:

(1) If $R \geqq Z$, the affected facility is in compliance.

(2) If $R < Z$, the affected facility is not in compliance.

(b) The emission reduction efficiency (R) achieved by the sulfur recovery technology is calculated by using the equation:

$$R = \frac{S}{S + E} \times 100 \qquad (3)$$

"S" and "E" are determined using the procedures and test methods specified in § 60.644 and § 60.645.

§ 60.644 Performance test procedures.

(a) For the purpose of determining (Y):

(1) Collect and analyze at least one sample per hour (equally spaced) during the performance test, using the method specified in § 60.645(a)(8).

(2) Calculate the arithmetic mean of all samples to determine the average H_2S concentration in mole percent.

(b) For the purpose of determining (X):

(1) Determine the average volumetric flow rate of the acid gas from the sweetening unit by continuous measurements made with a process flow meter during the performance test period. Express the result as standard cubic feet per day (scf/day).

(2) Calculate the average sulfur feed rate, in long tons per day, from the average volumetric flow rate, using the method specified in § 60.645(a)(1), and the average H_2S content [from § 60.644(a)] by the equation:

$$X = \frac{\text{(average volumetric acid gas flow, scf/day)(Y/100)(32 lb/lb mole)}}{\text{(385.36 standard cubic feet/lb mole)(2,240 lbs/long ton)}} \qquad (4)$$

(c) For the purpose of determining (S):

(1) Measure the sulfur accumulation rate in the product storage tanks using level indicators or manual soundings. Record the level reading at the beginning and end of each test run. Convert the level readings to mass (kilograms) of sulfur in the storage tanks, using the tank geometry and the sulfur density at the temperature of storage. Divide the change in mass by the test duration (hours and fractions of hours) to determine the sulfur production rate in kilograms per hour for each run.

(2) Calculate the arithmetic mean of the rates for each run to determine the average sulfur production rate to use in § 60.643(b).

(d) For the purpose of determining (E):

(1) Measure the concentrations of sulfur dioxide and total reduced sulfur compounds, using the methods specified in § 60.645(a) (5) through (7). The minimum sampling time for run shall be 4 hours. For each run the SO_2 and TRS concentrations shall be combined to calculate the total SO_2 equivalent concentration as follows:

Total SO_2 equivalent, (kg/dscm) = 0.001 (SO_2 concentration mg/dscm from Method 6) + 2.704×10^{-6} (SO_2 equivalents in ppmv, dry from Method 15 or from Method 16A)

(2) Measure the exhaust gas velocity, molecular weight, and moisture content using the methods specified in § 60.645(a) (2) through (4). Calculate the volumetric flow rate of the exhaust gas at dry, standard conditions using equation 2–10 in Method 2.

(3) Calculate the equivalent sulfur emission rate as elemental sulfur for each run as follows:

Sulfur emission rate = (total SO_2 equivalent, kg/dscm) (gas flow rate, dscm/hr)(0.50)

Calculate the arithmetic mean of the sulfur emission rate for each run to determine the average sulfur emission rate (E) to use in § 60.643(b).

§ 60.645 Performance test methods.

(a) For the purpose of determining compliance with § 60.642(a) or (b), the following reference methods shall be used:

(1) Method 1 for velocity traverse points selection,

(2) Method 2 for determination of stack gas velocity and calculation of the volumetric flow rate,

(3) Method 3 for determination of stack gas molecular weight,

(4) Method 4 for determination of the stack gas moisture content,

(5) Method 6 for determination of SO_2 concentration,

(6) Method 15 for determination of the TRS concentration from reduction-type devices or where the oxygen content of the stack gas is less than 1.0 percent by volume,

(7) Method 16A for determination of the TRS concentration from oxidation-type devices or where the oxygen content of the stack gas is greater than 1.0 percent by volume.

(8) The Tutwiler procedure in § 60.648 or a chromatographic procedure following ASTM E-260, which is incorporated by reference (see § 60.17), for determination of the H_2S concentration in the acid gas feed from the sweetening unit.

(b) The sampling location for Methods 3, 4, 6, 15, and 16A shall be the same as that used for velocity measurement by Method 2. The sampling point in the duct shall be at the centroid of the cross-section if the area is less than 5 m^2 (54 ft^2) or at a point no closer to the walls than 1 m (39 inches) if the cross-sectional area is 5 m^2 or more, and the centroid is more than one meter from the wall. For Methods 3, 4, 6 and 16A, the sample shall be extracted at a rate proportional to the gas velocity at the sampling point. For Method 15, the minimum sampling rate shall be 3 liters/minute (0.1 ft^3/minute) to insure minimum residence time in the sample line.

(c) For Methods 6 and 16A the minimum sampling time for each run shall be 4 hours. Either one sample or a number of separate samples may be collected for each run so long as the total sample time is 4 hours. Where more than one sample is collected per run, the average result for the run is calculated by:

$$C_s = \sum_{i=1}^{n} (C_{si}) \frac{(t_{si})}{T} \qquad (5)$$

Where:

C_s = time-weighted average SO_2 or TRS concentration for the run, (mg/dscm or ppmv, dry)

N = number of samples collected during the run

C_{si} = SO_2 or TRS concentration for sample i, (mg/dscm or ppmv, dry)

t_{si} = sampling time for sample i, (minutes)

T = total sampling time for all samples in the run (minutes)

(d) For Method 15, each run shall consist of 16 samples taken over a minimum of 4 hours. The equivalent SO_2 concentration for each run shall be calculated as the arithmetic average of the SO_2 equivalent concentration for each sample.

(e) For Method 2, a velocity traverse shall be conducted at the beginning and end of each run. The arithmetic average of the two measurements shall be used to calculate the volumetric flow rate for each run.

(f) For Method 3, a single sample may be integrated over the 4-hour run interval and analysis, or grab samples at 1-hour intervals may be collected, analyzed, and averaged to determine the stack gas composition.

(g) For Method 4, each run shall consist of 2 samples; one collected at the beginning of the 4-hour test period, and one near the end of the period. For each sample the minimum sample volume shall be 0.1 dscm (0.35 dscf) and the minimum sample time shall be 10 minutes.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 60.646 Monitoring of emissions and operations.

(a) At least once each calendar quarter the owner or operator of each affected facility subject to § 60.642(a) shall use the procedures specified in § 60.644 (a) and (b) to determine an average X and Y for use in equation (2) in § 60.642 to calculate an average minimum required sulfur dioxide emission reduction for that quarter. Data for the quarterly measurements for X and Y shall be collected over a test period of 12 hours made up of three 4-hour sample periods occurring within one 24-hour day. The time between the measurements of X and Y that are recorded for one calendar quarter and the measurements of X and Y recorded for the next consecutive calendar quarter is not to exceed 100 days.

(b) Continuous monitoring systems shall be installed, calibrated, maintained, and operated by the owner or operator subject to § 60.642 (a) or (b) as follows:

(1) A continuous monitoring system for the measurement of the temperature of the gas leaving the combustion zone of the incinerator. The monitoring device shall be certified by the manufacturer to be accurate to within ±1 percent of the temperature being measured.

(2) A continuous monitoring method for the measurement of the sulfur production rate (S). The monitoring method shall be certified by the manufacturer to be accurate to within ±2 percent of the rate being measured. The monitoring method may use an instrument to measure and record the sulfur production rate or it may be a method of measuring and recording the sulfur liquid levels in the storage tanks with a level indicator or by manual soundings with subsequent calculation of the sulfur production rate based on the tank geometry and stored sulfur density.

(3) A continuous monitoring system to measure the emission rate of SO_2 in the gases discharged to the atmosphere from a sulfur recovery plant if compliance with § 60.642 (a) or (b) is achieved through the use of an oxidation control system or a reduction control system followed by a continually operated incineration device. The SO_2 emission rate shall be expressed in terms of equivalent sulfur mass flow rates (kg/hr). The span of this monitoring system shall be set so that the equivalent emission limit of § 60.642 (a) or (b) will be between 30 percent and 70 percent of the measurement range of the instrument system.

(4) A continuous monitoring system to measure the emission rate of SO_2 equivalent compounds in the gases discharged to the atmosphere if compliance with § 60.642 (a) or (b) is achieved by the use of a reduction control system not followed by a continually operated incineration device. The SO_2 equivalent compound emission rate shall be expressed in terms of equivalent sulfur mass flow rates (kg/hr). The span of this monitoring system shall be set so that the equivalent emission limit of § 60.642 (a) or (b) will be between 30 percent and 70 percent of the measurement range of the system.

(5) The average sulfur emission reduction efficiency achieved (R) shall be calculated for each 12-hour clock interval, beginning at midnight and at noon. The 12-hour average R shall be computed based on the 12-hour averages for sulfur production rate (S) and sulfur emission rate (E), using equation (3) in § 60.643(b).

(i) Data obtained from the sulfur production rate monitoring system in subparagraph (2) shall be used to calculate a 12-hour average for S. Measurements are to be taken at the beginning and at the end of each 12-hour period.

(ii) Data obtained from the sulfur emission rate monitoring system in subparagraphs (3) or (4) shall be used to calculate a 12-hour average for E. The monitoring system must provide at least one data point in each successive 15-minute interval. At least two data points must be used to calculate each 1-hour average. A minimum of nine 1-hour averages must be used to compute each 12-hour average.

(c) The continuous monitoring systems required in § 60.646(b) (1) and (2) shall be calibrated at least annually according to the manufacturers' specifications.

(d) The continuous monitoring systems required in § 60.646(b) (3) and (4) shall be subject to the emission monitoring requirements of § 60.13 of the General Provisions. For conducting the monitoring system performance evaluation required by § 60.13(c), Performance Specification 2 shall apply, and Method 6 shall be used for systems required by § 60.646(a)(3). Performance Specification 5 and Method 15 shall be used for systems required by § 60.646(a)(4).

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 60.647 Recordkeeping and reporting requirements.

(a) Records of the measurements required in § 60.642 (a), (b) and (c) and § 60.646 (a) through (d) must be retained for at least 2 years following the date of the measurements by owners and operators subject to this subpart. This requirement is included under § 60.7(d) of the General Provisions.

(b) Each owner or operator required to install a continuous monitoring system shall submit a written report of excess emissions to the Administrator for each calendar quarter. This requirement is included under § 60.7(c) of the General Provisions. For the purpose of these reports, excess emissions are defined as:

(1) Any 12-hour period (clock intervals beginning at midnight and noon) during which the average sulfur emission reduction efficiency (R) is less than the minimum required efficiency (Z).

(i) For the purpose of determining "R", "E" is to be determined using the sulfur mass flow rate obtained in § 60.646(b) (3) or (4).

(ii) Facilities subject to § 60.642(a) shall use the "Z" value calculated for the current calendar quarter according to the procedure in § 60.646(a).

(iii) Facilities subject to § 60.642(b) shall use "Z" value of 74.0 percent.

(2) Any 12-hour period during which the average temperature of the gases leaving the combustion zone of an incinerator is less than 811°K (1,000°F). Each 12-hour period must consist of at least 48 temperature measurements, equally spaced over the 12 hours.

(c) Each owner or operator of a facility with a design capacity less than 1.0 LT/D of H_2S in the acid gas shall keep for the life of the facility an analysis demonstrating that the facility's design capacity is less than 1.0 LT/D of H_2S, expressed as sulfur.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 60.648 Optional procedure for measuring hydrogren sulfide in acid gas—Tutwiler Procedure.[1]

When an instantaneous sample is desired and H_2S concentration is ten grains per 100 cubic foot or more, a 100 ml Tutwiler burette is used. For concentrations less than ten grains, a 500 ml Tutwiler burette and more dilute solutions are used. In principle, this method consists of titrating hydrogen

[1] Gas Engineers Handbook, Fuel Gas Engineering Practices, The Industrial Press, 93 Worth Street, New York, New York, 1966, First Edition, Second Printing, page 6/25 (Docket A-80-20-A, II-I-67).

sulfide in a gas sample directly with a standard solution of iodine.

Apparatus. (See Figure 1.) A 100 or 500 ml capacity Tutwiler burette, with two-way glass stopcock at bottom and three-way stopcock at top which connect either with inlet tubulature or glass-stoppered cylinder, 10 ml capacity, graduated in 0.1 ml subdivision; rubber tubing connecting burette with leveling bottle.

Reagents. (1) Iodine Stock Solution, O.1N. Weight 12.7 g iodine, and 20 to 25 g cp potassium iodide for each liter of solution. Dissolve KI in as little water as necessary; dissolve iodine in concentrated KI solution, make up to proper volume, and store in glass-stoppered brown glass bottle.

(2) Standard Iodine Solution, 1 ml=0.00171 g I. Transfer 33.7 ml of above 0.1N stock solution into a 250 ml volumetric flask; add water to mark and mix well. Then, for 100 ml sample of gas, 1 ml of standard iodine solution is equivalent to 100 grains H_2S per 100 cubic feet of gas.

(3) *Starch Solution.* Rub into a thin paste about one teaspoonful of wheat starch with a little water; pour into about a pint of boiling water; stir; let cool and decant off clean starch solution. Make fresh solution every few days.

Procedure. Fill leveling bulb with starch solution. Raise (L), open cook (G), open (F) to (A), and close (F) when solution starts to run out of gas inlet. Close (G). Purge gas sampling line and connect with (A). Lower (L) and open (F) and (G). When liquid level is several ml past the 100 ml mark, close (G) and (F), and disconnect sampling tube. Open (G) and bring starch solution to 100 ml mark by raising (L); then close (G). Open (F) momentarily, to bring gas in burette to atmospheric pressure, and close (F). Open (G), bring liquid level down to 10 ml mark by lowering (L). Close (G), clamp rubber tubing near (E) and disconnect it from burette. Rinse graduated cylinder with a standard iodine solution (0.00171 g I per ml); fill cylinder and record reading. Introduce successive small amounts of iodine thru (F); shake well after each addition; continue until a faint permanent blue color is obtained. Record reading; subtract from previous reading, and call difference D.

With every fresh stock of starch solution perform a blank test as follows: introduce fresh starch solution into burette up to 100 ml mark. Close (F) and (G). Lower (L) and open (G). When liquid level reaches the 10 ml mark, close (G). With air burette, titrate as during a test and up to the same end point. Call ml of iodine used C. Then,

Grains H_2S per 100 cubic feet of gas=100 (D−C)

Greater sensitivity can be attained if a 500 ml capacity Tutwiler burette is used with a more dilute (0.001N) iodine solution. Concentrations less than 1.0 grains per 100 cubic feet can be determined in this way. Usually, the starch-iodine end point is much less distinct, and a blank determination of end point, with H_2S-free gas or air, is required.

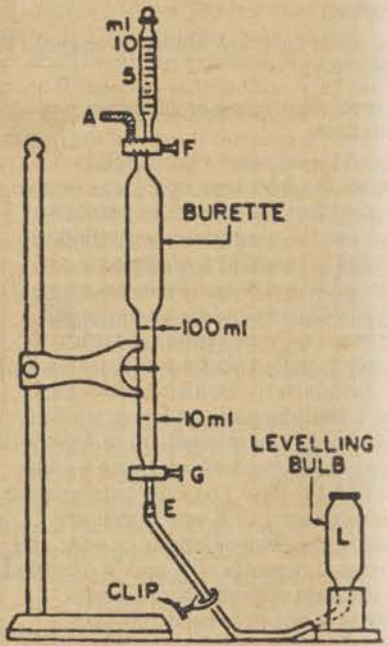

Figure 1. Tutwiler burette (lettered items mentioned in text).

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